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Investments in Agriculture

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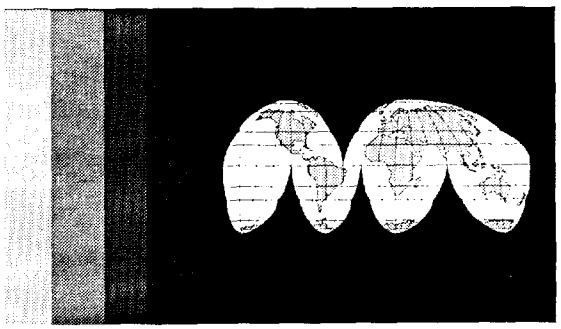

USAID Program and Operations
Assessment Report No. 15

Investments in Agriculture

A Synthesis of the Evaluation Literature

by

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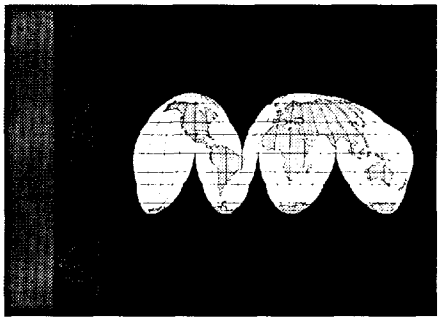
Center for Development Information and Evaluation
U.S. Agency for International Development

July 1996



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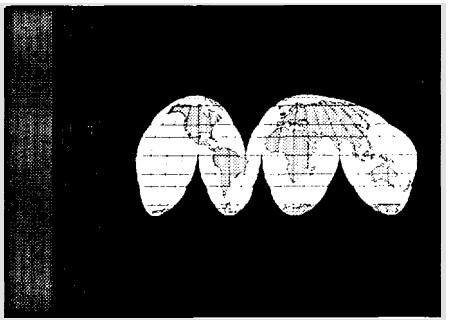

Preface

THIS ASSESSMENT EXAMINES the conditions under which investments in the principal areas of agricultural development have been successful, and unsuccessful, in contributing to agricultural growth in developing countries.

A desk study, this assessment uses an evaluation synthesis methodology developed by the General Accounting Office. The methodology relies primarily on past evaluations and has certain limitations. First, because it is based on the evaluation literature, it can address only questions covered in that literature. In the case of this report, some of the six questions the study sought to address were not satisfactorily addressed in past evaluations. And second, unlike original research, it does not generate new ideas. (However, a review and synthesis of past experience often yields new insights about old ideas.)

USAID's Center for Development Information and Evaluation (CDIE) initiated the study by commissioning background papers in four of the five major areas of agricultural development. The fifth major area, rural infrastructure, had already been covered by Raisuddin Ahmed and Cynthia Donovan of the International Food Policy Research Institute (IFPRI) in a synthesis of the literature published in 1992. The other four areas are agricultural policy reform and planning, agricultural technology development and diffusion, agricultural services, and agricultural asset distribution and access. Each background paper used the same analytical framework that had been used in the IFPRI synthesis on rural infrastructure, thereby facilitating preparation of the final desk study. However, the four papers were prepared under rigid time constraints (about 7 person-weeks per paper)—another limitation of the study.

The consultant team that drafted the four background papers included Scott Simons and Lawrence Kent (*Agricultural Policy Reform and Planning*), James F. Oehmke (*Issues of Agricultural Technology Development and Diffusion*), Richard L. Meyer and Donald W. Larson (*Issues in Providing Agricultural Services in Developing Countries),* and Virginia Lambert with Mitchell A. Seligson (*Asset Distribution and Access: Land Tenure Programs*). James Esselman conducted a thorough search of the evaluation literature, both USAID and non-USAID, and David Wilcock helped coordinate the study.

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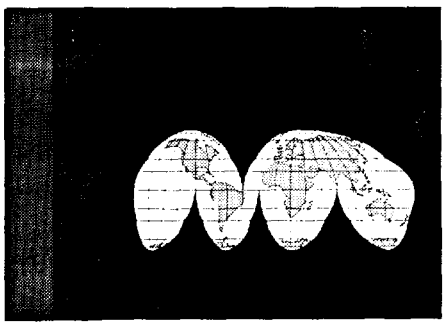
The synthesis benefited greatly from a review by several people, including the expert consultants named above. In addition, Luther Tweeten, G. Edward Schuh, John Eriksson, and Michael Calavan provided insightful comments that were particularly helpful.



Summary

USAID HAS PUT substantial resources into agricultural development in low-income countries during the past 30 years (and more). During 6 years of the 1980s, annual USAID investments in agriculture exceeded $1 billion. It is probably fair to say that no other component of U.S. foreign economic assistance during this period was larger.

"Agriculture" is interpreted broadly in section 103 of the Foreign Assistance Act. Agricultural development comprises five basic subsectors, and over the years USAID has provided resources to support and strengthen each of them. They are 1) an economic policy framework conducive to agricultural growth; 2) agricultural technology applicable to particular soil, water, and climatic conditions; 3) roads and related rural infrastructure to transport agricultural inputs and market outputs; 4) agricultural services (especially credit); and 5) secure tenure arrangements to encourage investment in land and other agricultural assets.

This desk study seeks to identify the conditions under which investments (especially USAID investments) in these areas have been successful and unsuccessful in contributing to agricultural growth in the developing countries.

The evaluation synthesis methodology was used to carry out the study (see appendix B). This methodology is often used by the General Accounting Office to analyze large amounts of sometimes conflicting information about a particular program—in this case, USAID's agricultural assistance program. To carry out the study, well-qualified consultants first synthesized the evaluation literature in the five areas just mentioned. Each background paper followed the analytical framework used by the International Food Policy Research Institute in its 1992 synthesis of the literature on infrastructure (Ahmed and Donovan 1992). The consultants' expertise, coupled with a literature search conducted by CDIE's Research and Reference Service, formed the foundation for the background papers. The papers, in turn, constituted the basis for drafting this study (a synthesis of syntheses), *Investments in Agriculture.*

The study undertakes to answer six questions:

1. Is there a logical sequence for investing in the five agricultural subsectors?

2. Has successful agricultural development occurred in the absence of investments in one or more of the five areas?

3. Under what conditions have investments in each area been relatively successful or resulted in a relatively high economic rate of return?

4. Is the private sector best suited to invest in certain areas (such as agricultural services), and is the public sector best suited to invest in others (such as rural infrastructure)?

5. Among the various agencies that implement agriculture activities (including nongovernmental organizations), are some better suited in certain areas than others?

6. Does the United States have a comparative advantage over others in providing agricultural assistance in some areas?

The evaluation literature was more helpful in answering the first three questions (about the relative importance of alternative investments) than it was in answering the last three (about the most appropriate entities to undertake investments or implement projects). Although most of the six questions concern the role of the public sector, experience suggests that successful agricultural development must rely primarily on the market and that most investment decisions must be made by the private sector. As the findings show, however, the public sector must provide the enabling policy environment and the essential "public goods" to allow the private sector to operate effectively.

Findings

Analysis of the evaluation literature found that

1. *There is a preferred sequencing of investments in agriculture.* The first priority is to develop an environment in which agriculture will function. Such an environment includes at least three central components: *policies, technology, and infrastructure.* Of greatest concern are economic policies that directly or indirectly affect agriculture. Farmers must have an opportunity to make a profit, and the economic policy environment must not distort this opportunity. If a threshold level of proper policies is not in place, it is seldom worthwhile for donors to make other investments in agriculture; nor is it worthwhile for farmers to take risks and use new technologies to increase production beyond subsistence levels.

The literature does not suggest an optimal sequence for investing in technology relative to infrastructure. Investments in both work synergistically if the proper policy environment is in place. High-yielding technology must be available to promote growth. At the same time, agriculture cannot perform well without some rudimentary infrastructure.

Provision of agricultural services often relies on the three foregoing subsectors for its success. Many projects in credit or marketing have failed, usually because countries were pursuing economic policies heavily biased against agriculture. Credit projects have also run into difficulty for lack of good technology for farmers to adopt. Moreover, there has been little value in supplying credit (or modern inputs associated with new technologies) to farmers who lacked the roads to acquire the inputs (such as seed and fertilizer) and transport the harvest to market.

The literature suggests no particular stage of development for investing to improve farmers' access to land. It does, however, suggest that when investments are made to improve land distribution and secure tenure, they typically are motivated by a political objective, not by economic efficiency. That is despite the fact that a highly inequitable and insecure land-tenure structure is very inefficient. Regardless of the motivation, such investments have an economic impact, positive or negative, intended or unintended. The effect is likely to be more positive if ancillary services to support the investment are already in place. In this sense, then, investments to improve access to land should *support* agricultural development, not initiate the process.

2. *It is inconclusive whether investments in all five subsectors of agriculture are essential.* What does emerge from the literature is that a country's predisposition to agricultural development is important for success—regardless of donor investments. Some threshold level of economic and social stability is essential for agricultural progress. So too is an economic policy environment that is not significantly biased against agriculture. This does not mean that policies should tilt *in favor of* agricul-

ture. In the long run that can reduce overall efficiency. It can also become costly and politically difficult to remove.

Most countries that have achieved sustained economic growth have also transformed their agriculture. Once it is no longer possible to expand acreage, gains in output must be achieved by increasing yields. This requires improved biological and mechanical technology. Although investments in new technologies are critical, there is no *empirical* evidence that investments in agricultural extension or in higher agricultural education are necessary.

Agricultural development generally does not occur without investments in rural infrastructure. To the extent growth does occur, it is likely to be far less rapid and efficient than would otherwise be the case. Agricultural development can occur in the absence of investments in agricultural services, but a high level of agricultural development will, at some point, require an increasingly wide variety of such services.

Likewise, agricultural growth can occur in the context of insecure and inequitable access to land, but broad-based agricultural development is less likely without agrarian reform.

3. *Investments have been most successful when they have removed a bottleneck or when existing conditions have favored progressive change.* For example, agricultural research is more likely to have a high payoff in countries where inadequate infrastructure has been replaced and modernized. Similarly, infrastructure investments are more likely to reap rewards in the presence of supportive economic policies and the availability of improved agricultural technology. Economic analyses have not been very helpful in guiding decisions on resource allocation among sectors of an economy (or among the five subsectors of agriculture). They have, however, helped in making *intrasectoral* choices among various types of projects and technical alternatives.

In policy reform, the most successful activities have been those that supported an ongoing program of policy change. Attempts by donors to *introduce* major new policy directions through nonproject assistance have often produced disappointing results. The most successful capacity-building projects in policy analysis have occurred in countries where a) advisers had access to senior government decision-makers, b) advisers were assigned appropriate counterparts, c) highly trained staff had incentives to remain with the analysis units, and d) adequate funding and supplies were available. In contrast, countries uncommitted to reform have had little use for even the most cogent of analyses produced by such projects.

One lesson from the rate-of-return literature overwhelms all others: investments in agricultural technology and its diffusion generate high economic returns. The social benefits from such investments justify the costs in a wide variety of countries, for a wide variety of commodities, and under a wide variety of conditions.

With regard to infrastructure development, resources tend to be allocated only when pressure for services are felt within the political system. And when this occurs, decisions on how much to allocate to infrastructure relative to other activities are typically a matter of judgment; no prescriptions emerge from the evaluation literature.

Few studies have measured the economic rate of return on investments in agricultural services (as with policy reform). This is largely due to the difficulty of measuring the return to investments that, by their nature, do not directly increase agricultural output. Instead, they create an enabling environment to encourage the use of directly productive inputs such as improved seeds, fertilizers, chemicals, and machinery.

It's the same with land tenure. Cost–benefit analyses have not been undertaken for investments that encourage more equitable distribution of, and secure access to, land and other agricultural assets. However, the literature does identify two costs of *not* investing in this area. First are economic costs associ-

ated with maintaining an agrarian structure characterized by high efficiency losses, low profitability, and few incentives to invest in physical and human capital. Second are social costs manifested by peasant uprisings, civil war, and protracted and violent struggles.

Despite the costs, governments typically do not invest in more equitable land distribution. The reasons are twofold. First, governments lack the political support to implement change. And second, the cost of land reform is so high as to make it infeasible in many cases. Small farmers cannot pay for the land they receive, and elites resist paying for the reform either through taxes or through receipt of devalued bonds as compensation for expropriated land. Other mechanisms to improve access to land and tenure security (such as titling, land registration, land markets, and land taxation) also have been difficult to implement successfully.

4. *Government should become involved in a particular investment only if it raises real national income more than would be the case if the public sector were* not *involved.* Similarly, the public sector should become involved only when such involvement improves the performance of the private sector rather than displaces it.

Thus, it is logical for the public sector to invest in development of agricultural technology and rural infrastructure. These investments normally have the characteristics of public goods; it is difficult for private providers to recover the costs of such investments. However, the cost of *using* the services made possible by the rural infrastructure, including its operation and maintenance (as distinct from the infrastructure itself) should be paid by the users, not by the government or by donors. For example, the costs of the transportation services made possible by roads or the water carried by major irrigation canals should be borne by users.

In a like manner, it is logical that the public sector has been the recipient of most donor assistance designed to support economic policy reform and planning as well as improved asset distribution and access, because it is the responsibility of governments to take decisions in these areas. Conversely, the private sector can be expected to invest in agricultural services when it is profitable to do so, obviating the need for public sector involvement.

5. *For the most part, the evaluation literature is silent on the question of which agencies are best suited to implement which agricultural activities.* Donors have been important in providing the analytical underpinning for policy reform, but governments have actually implemented such reforms. Similarly, donors can provide advice on how best to go about implementing programs to improve access to land, but governments are best suited to implement such programs. Some have asserted that U.S. land-grant universities are well positioned to implement agricultural technology development and diffusion. They may be, but the evaluation literature provides no empirical evidence either to substantiate or refute this assertion. Conventional wisdom suggests private contractors are best suited to implement infrastructure activities, but again there is no empirical evidence one way or the other. As for providing financial services, private commercial banks have a better record than specialized agricultural development banks. Likewise, private firms have a better track record than government agencies in providing efficient and timely agricultural inputs and marketing services.

6. *Similarly, the evaluation literature provides limited insights as to the comparative advantage of the United States' providing agricultural assistance in the five subsectors.* It does suggest that the United States may have an advantage over other bilateral donors in providing assistance in agricultural policy reform and planning. Although U.S. agriculture is among the most productive in the world (owing largely to yield-increasing technology developed as a result of investments in agricultural research) there is no empirical evidence that the United States enjoys an advantage in providing assistance in technology development. Rural infrastructure often requires a ma-

jor capital investment. Donors with relatively plentiful resources, including the multilateral development banks, would seem to be in the best financial position to underwrite big-ticket capital projects. And although the United States has a large pool of analytical talent to study problems concerning delivery of financial and other agricultural services, the private sector in most developing countries is ordinarily best equipped to deliver such services. Finally, international donors, including the United States, have little influence over whether programs are introduced to alter the agrarian structure.

Management Recommendations

The evaluation literature provides clear answers to some, but not all, of the six questions concerning *when* to make investments in the five subsectors of agriculture, *who* should make those investments, and under *what* conditions they are most likely to succeed. But even when the literature is unclear, it provides insights that can help USAID better understand some issues concerning agricultural development in low-income countries.

First, the literature strongly suggests a country's predisposition to agricultural development is an important condition for success—whether or not this predisposition is linked to donor investments. *In countries where agriculture cannot be profitable because of an adverse economic policy environment, USAID should invest reluctantly, if at all, in agricultural development.*

Second, bottlenecks to agricultural growth are likely to be most binding in policy reform, technology development, and rural infrastructure. They are less of an impediment in agricultural services and asset distribution. Because there is a preferred sequencing of investments in agriculture, *USAID should concentrate its investments on priority areas to alleviate the binding constraints (not* all *constraints) to agricultural growth.*

Once USAID has determined that it makes sense to invest in agricultural development, the following recommendations merit consideration:

1. *Policy reform and planning.* Nonproject assistance (such as cash transfers) can help governments create an economic policy environment designed to help agriculture markets work. Such investments are *most* successful when they are used to facilitate ongoing economic policy reforms. They are *less* successful when they are used to initiate new policy reforms or to "buy" reforms to which the government is not committed. Accordingly, *USAID should provide nonproject assistance to support economic policy reform only in countries where it will be used to facilitate reforms already under way or with significant local support.* USAID should also support the training of those most likely to return to their countries and become leaders in giving policy advice.

2. *Technology development and diffusion.* If high economic rates of return were the only criterion USAID used in deciding how to invest in agriculture, development of new agricultural technology would probably top the list. An even more compelling reason to invest in the development of high-yielding or cost-reducing technologies is that most countries have not achieved sustained economic growth without transforming their agriculture. Such transformation typically requires technical change—that is, improved biological and mechanical technology. *Therefore, USAID should invest in development of new agricultural technologies.* It should emphasize adaptive rather than basic research. It should promote technology transfer from neighboring countries and from international agricultural research centers. The Agency should also support agricultural research necessary simply to sustain existing yield levels.

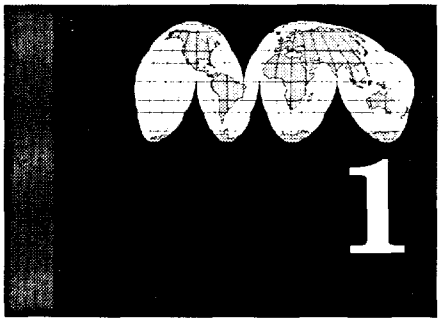
3. *Rural infrastructure.* Donors are understandably reluctant to invest in rural infrastructure. Such investments are costly, and existing infrastructure is often poorly main-

tained by the public sector. However, it is unlikely agricultural growth will occur in the absence of investments in rural infrastructure. *Therefore, donors should consider investing in new rural infrastructure and, if justified by economic analysis, in maintenance of existing infrastructure as well.*

4. *Agricultural services.* The *private* sector is best equipped to provide agricultural inputs and services that can be sold for a profit. The *public* sector has an important role in helping markets work better (as distinct from displacing markets). Although donors may be in a position to *advise* developing countries on how best to establish input distribution systems, strengthen financial services, support marketing and storage activities, and develop price information systems, *actual investments in agricultural services are best left to the private sector.*

5. *Asset distribution and access.* Programs designed to improve the distribution of land and other agricultural assets are motivated by political objectives, not by agricultural development objectives. Donors may be in a position to *advise* governments on how best to implement titling schemes, cadastral surveys, land reforms, and other activities designed to improve access to agricultural assets. But *most investments in this area are best left to the indigenous public sector.*

The foregoing recommendations are reasonable, consistent with conventional wisdom, and, in many cases, applicable across most countries. But they are generalizations; there is no substitute for careful analysis. USAID should analyze each country situation before investing in agricultural development.



1 The Five Elements of Agricultural Development

THIS STUDY IDENTIFIES the conditions under which investments in agricultural development have been successful and unsuccessful in contributing to agricultural growth in developing countries. It then offers recommendations for managing USAID's agriculture portfolio in the future.

'Agriculture': a Working Definition

For purposes of this desk study, "agriculture" is defined as those activities traditionally funded under section 103 of the Foreign Assistance Act (U.S. 1994, 24–27). Section 103 is interpreted broadly in the legislative history to consist of activities in support of rural nonfarm production as well as agricultural production. These activities can be conveniently organized into five subsectors.

- *Policy reform and planning* (budget support for agricultural policy reform, analytical capacity building)
- *Technology development and diffusion* (agricultural research, agricultural education, agricultural extension)
- *Rural infrastructure* (rural roads, rural electrification, irrigation)
- *Agricultural services* (agricultural credit, input and output marketing, crop storage)
- *Asset distribution and access* (land tenure and land reform, land use and land settlement, local participatory institutions, and decentralization)

USAID's 1978 *Agricultural Development Policy Paper* organized the activities covered under section 103 (excluding nutrition) into those five subcategories. They have remained fundamentally unchanged since that time (although certain elements have been refined). A sixth subcategory—natural resources and the environment—was added in the mid-1980s in recognition of the importance of *sustainable* agricultural development. This subcategory includes activities in forestry, environmental planning, and soil and water conservation. Adding this subcategory reflected the fact that section 103 had become the source of about 75 percent of the funding of these natural resources and environmental activities. Because these activities have already been evaluated by CDIE,[1] they were excluded from this study.

[1] Two environmental assessments were completed in early 1995: *Stemming the Loss of Biological Diversity* and *Forestry and the Environment*. A third, *Agriculture and the Environment*, is forthcoming.

Thus, successful agricultural development normally requires 1) an economic policy framework that is conducive to agricultural growth and in which farming can be profitable; 2) agricultural technology applicable to particular soil, water, and climatic conditions; 3) roads and related rural infrastructure to transport agricultural inputs such as seeds and fertilizers and to market agricultural outputs; 4) key agricultural services such as credit, marketing, storage, and processing; and 5) secure tenure arrangements to encourage investment in land and other agricultural assets.[2]

Most development professionals agree that successful agricultural development must rely primarily on the market and that most investment decisions will have to be made by the private sector. In contrast, most of the issues addressed in this synthesis concern the role of the public sector, which among other things must provide the enabling policy environment and the essential "public goods" to allow the private sector to operate effectively.

Magnitude of USAID Investments in Agriculture

USAID has obligated substantial resources to support agricultural development in low-income countries during the past 30 years (and more). During 6 years of the 1980s, investments in agriculture (excluding natural resources and the environment) exceeded $1 billion (including resources from both the Development Assistance Account and the Economic Support Fund).

Table 1. Allocation of USAID Agriculture Resources, by Subsector, in $ Millions, FYs 1989-93

Subsector	1989	1990	1991	1992	1993	1994
1) Policy reform and planning	139	132	166	193	175	121
2) Technology development diffusion	239	152	175	121	125	51
3) Rural infrastructure	115	140	131	87	50	41
4) Agricultural services	273	141	182	155	183	157
5) Asset distribution and access	40	12	20	0	0	0
6) Crop, livestock, and fisheries production	—	—	—	70	56	48
Total	806	577	674	626	589	418

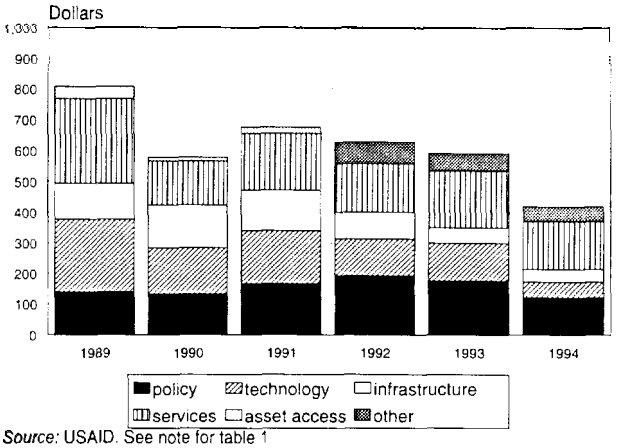
Source: USAID.

Note: The five subsectors are aggregations of investments in specific activities tracked by USAID: 1) agricultural management, planning, and policy; agricultural policy reform; agricultural policies and planning; 2) agricultural research;; agricultural technology development; research management; agricultural education; agricultural extension education; agricultural training and extension; 3) rural roads; irrigation; rural electrification; agricultural infrastructure; 4) agricultural credit; agribusiness; agricultural marketing; agricultural inputs; pest management; and 5) agricultural land use and planning. Investments in crop, livestock, and fisheries production specified as "other" in figure 1) were funded before FY 1992 but were not tracked as such.

[2] Others have recognized the importance of these same elements, though often by different names. For example, Carroll Streeter identifies eight elements: technology, persuasion, "whole system" effort, land, credit, materials, markets, and organization (Streeter n.d.). Arthur Mosher's "essentials for agricultural development" are markets, technology, supplies and equipment, production incentives, and transportation (Mosher 1966).

As a proportion of total development assistance, support for agriculture has changed substantially over the years. In 1973 when the "New Directions" legislation was enacted, Agency investments in "food production and nutrition" made up 26 percent of total development assistance; in 1974, 35 percent; and in 1975, an estimated 54 percent (A.I.D. 1975). From 1975 through 1985, USAID investments in agriculture averaged 55 percent of total development assistance. In 1985 they decreased to less than 50 percent for the first time since 1975; and in 1990 they decreased to less than 40 percent. They remain below that level today.

Figure 1. Allocation of USAID Agriculture Resources, by Subsector, in $ Millions, FYs 1989-94



Source: USAID. See note for table 1

The composition of USAID investments in agriculture has also changed over time. Table 1 and figure 1 show that total funding for agriculture has declined in recent years, from $806 million in FY 1989 to $418 million in FY 1994. Funding has decreased relatively less for policy reform than for the other four components.

Table 2 shows the percentage of total USAID and World Bank funds going to the agricultural sector over the same six-year period. For USAID, agriculture's share of total funding (Development Assistance Account and Economic Support Fund) has been declining fairly steadily, from 14 percent to 6 percent of total funding. For the World Bank, agriculture's share has increased to 19 percent from 16 percent.

Evaluation Issues

CDIE has carried out evaluative work in most of the five agricultural areas. The work includes major studies on economic policy reform in Africa (Lieberson 1991); agricultural

Table 2. Allocation of USAID Agriculture Resources, to Agriculture, in $ Millions and as a Percent of Total Economic Assistance, FYs 1989–94

	1989	1990	1991	1992	1993	1994
USAID						
Agriculture allocation	806	577	674	626	589	418
Total economic assistance	5,900	6,684	7,353	6,572	6,776	6,641
Percent of total	14	9	9	10	9	6
World Bank						
Agriculture allocation	3,490	3,707	3,707	3,894	3,267	3,907
Total lending	22,367	20,702	22,685	21,706	23,696	20,836
Percent of total	16	18	16	18	14	19

Source: table 1; USAID, *Congressional Presentation*, FYs 1992, 1993, and 1994; and World Bank, *Annual Report*, 1991, p. 179; 1993, p. 165; and 1994, p. 147.

research (Murphy 1983), agricultural extension (Byrnes 1990), and higher agricultural education (Hansen 1989); rural roads (Anderson 1982), rural electrification (Wasserman 1983), and irrigation (Steinberg 1983); and agricultural services and credit (Solem 1985). In addition the Agency completed a comprehensive review of land reform (1969) and of agricultural credit (1973). Drawing on these and many other program evaluations, this study seeks to answer six questions:

1. Is there a logical sequence for investing in the five agricultural subsectors?

2. Has successful agricultural development occurred in the absence of investments in one or more of the five areas?

3. Under what conditions have investments in each of the subsectors been relatively successful or resulted in a relatively high economic rate of return?

4. Is the private sector best suited to invest in certain areas (such as agriculture services), and is the public sector best suited to invest in others (such as rural infrastructure)?

5. Among the various agencies that implement agriculture activities (including nongovernmental organizations—NGOs), are some better suited in certain areas than others?

6. Does the United States have a comparative advantage over others in providing agricultural assistance in some areas?

The study rests on the assumption that agricultural growth is essential to sustainable economic development in most low-income developing countries. Thus, these six questions concern the composition of investments in agriculture, not the relative importance of agriculture investments relative to nonagriculture investments. (Appendix A summarizes the role of agriculture in economic growth.)

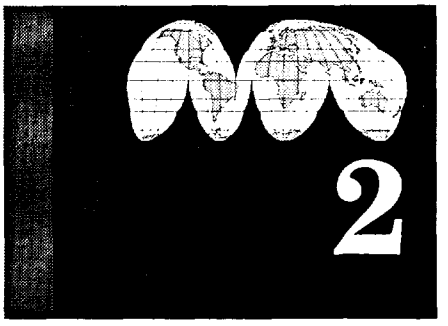
Evaluation Methodology

The study uses the evaluation synthesis methodology, which is specifically designed for the "rapid production of information relevant to a specific program and the analysis of large amounts of sometimes conflicting information on the topic" (GAO 1992). This methodology involves seven steps as set forth in appendix B.

Sections2–6 are organized around each of the five elements of agricultural development.[3] In each case, the element is defined in general, programmatic (not technical) terms, the magnitude of donor funding is reported to the extent data are available, and the overall effect of past investments in each subsector is assessed. Section 7 is organized around each of the six questions identified above. Section 8 offers management recommendations.

Three caveats: First, this desk study and the methodology on which it is based are designed to permit generalizations in answer to the six questions; clearly, there will be exceptions to these generalizations in some specific country situations. Second, because it is based primarily on past evaluations, the study does not generate new knowledge, but by synthesizing a vast body of existing knowledge, it is expected to yield new insights. Third, the background papers on which the study is based were completed in a short time (generally seven weeks); consequently, only a portion of the evaluation literature could be reviewed.

[3] Investments to strengthen NGOs, cooperatives, farmer organizations, water user organizations, and other local institutions that emphasize participation and decentralization are typically designed to help ensure farmers' access to land and related agricultural assets. Because local institutions are important, a CDIE study of rural institutions is needed.



2 Agricultural Policy Reform and Planning

THIS FIRST ELEMENT of agricultural development is generally pursued through two major kinds of investments: 1) *balance-of-payments support* (capital transfers) to encourage or support economic policy reform and 2) *technical assistance and training* in economic planning and policy analysis.[4]

Balance-of-payments support consists of cash or commodities provided to host country governments to support their efforts to liberalize economic policies, including agricultural policies. The objective of such support is both to leverage significant changes in economic policies and to cushion against adverse and often politically unpopular short-term effects of these changes. Technical assistance and training for planning and policy analysis have commonly supported policy analysis units established in ministries of agriculture, planning, and finance. The objective of such units is to provide decision-makers with comprehensive policy options derived from improved analytical expertise.

Donor attempts to support economic policy changes in developing countries with capital transfers are described in various ways. Some observers have characterized these programs as "trading cash for policy reform"; others emphasize that such transfers make reforms easier by cushioning populations from the negative side effects of economic changes. Generally, adjustment operations that cushion or ease incipient or ongoing reforms have met with more success than those that attempted to buy new reforms. Similarly, policy dialog has met with more success than policy conditionality. The one consists of congenial attempts to persuade governments to enact reforms, whereas the other consists of more explicit leveraging—governments agree to policy changes in response to positive or negative incentives by the donor (Casen 1986).

Some adjustment operations concentrate on macroeconomic reforms that indirectly affect agriculture. An example is adjustments in the foreign exchange rate that shift the terms of trade to favor a previously disadvantaged agricultural sector. Other operations focus directly on agricultural policy issues such as lifting agricultural price controls. The International Monetary Fund and World Bank provide the major portion of adjustment assistance in macroeconomic affairs; adjustment assistance specific to agriculture is provided by the World Bank and to a lesser extent by USAID. USAID

[4] This section is based on a synthesis prepared by Scott Simons and Lawrence Kent, *Agricultural Policy Reform and Planning*.

has been the lead donor in establishing and developing planning and policy analysis units.

Historical Context

Policy dialog and policy conditionality have been in the limelight over the past dozen years or so, but donor conditionality extends back well before 1980, especially in India and Latin America.

In India, American officials in 1965 "thought that Indian [agricultural] policies needed changing and that it was appropriate to use transfers, especially of the nonproject kind, to encourage such changes" (Lewis n.d., 15). Accordingly, the U.S. Government demonstrated its disapproval of India's approach to agriculture by withholding PL 480 food assistance upon which India depended. Only after that nation formally adopted a new agricultural strategy along the lines suggested by U.S. officials did President Johnson authorize release of PL 480 food assistance and resumption of nonproject lending (with a $50 million fertilizer loan). In retrospect, it is clear agricultural policy reforms in India were needed and that their adoption owes much to U.S. pressure. But India's leaders resented being pressured into reform, especially because PL 480 shipments that were withheld were crucial during the drought years of the mid-1960s (Lewis 29).

In some ways, the experience in Latin America with the Alliance for Progress parallels that of India. However, most of the conditionality associated with the Alliance supported stabilization measures and other macroeconomic reforms; agriculture was addressed only indirectly. According to most observers, the results were poor. Berg, for example, notes "few traces of the exercise were visible by the end of the decade" (Berg 1991, 216). Heller and Wionczek (1988, 134) state the "Alliance experience can be interpreted as an overwhelming repudiation of the general efficacy of the assumption [that conditionality can work]."

Disappointment with the unpopular (though effective) Indian experience and the Alliance's macroeconomic (and thus indirect) focus prompted USAID to shift away from conditionality and toward specific investment projects in the 1970s (Weintraub 1989, 24). Indeed, most projects during this decade "were conventionally designed to work within rather than to change the domestic policy environment. . . ." (FAO 1989, 33).

The project mode, however, had revealed its limitations by the end of the decade. By 1980, donors began to reach a consensus that the policy environment was so negative in so many developing countries that it was necessary to engage in policy dialog to promote reform and adjustment. The World Bank developed new loan instruments for this function: structural adjustment loans (SALs) were used for the first time in 1980, and sectoral adjustment loans (SECALs), in 1983. The International Monetary Fund increased its conditional lending to developing countries through its Structural Adjustment Facility and Enhanced Structural Adjustment Facility.

USAID began turning its attention to free markets and the economic policies necessary to make them work. And despite the disappointing experience with policy conditionality in India and under the Alliance for Progress, USAID again began to provide policy-conditioned assistance, much of it addressing agricultural issues. In promoting policy changes, the Agency used cash transfers, food aid, and commodity import programs.

USAID and World Bank Funding of Agricultural Policy Reform and Planning

Since 1960 USAID has invested $2.7 billion in 221 agricultural policy reform and planning activities worldwide (see table 3). About three fourths of the activities have been small projects designed to develop capacity in policy

Table 3. Investments in Agricultural Policy Reform and Planning, USAID and World Bank, by Region, in $Millions, 1960–93

Activity	Africa	Asia/NE	LAC	Total
USAID				
Capacity-building[a]				
—number of projects	53	39	77	69
—cost	159.8	402.1	102.4	664.2
Adjustment programs[b]				
—number of programs	37	8	7	52
—cost	727.5	859.0	443.8	2,030.0
World Bank				
Adjustment operations[c]				
—number of SECALs	21	6	10	37
—cost	1,500.0	1,200.0	2,600.0	5,300.0
—number of SALs	45	28	23	96
—cost	5,100.0	8,200.0	2,400.0	15,700.0

Note: All figures are estimates and may not account for the universe of projects and programs in agricultural policy reform and planning. Funding figures in particular are likely to be conservative.

[a]Tilney and Block (1988a) table 1 (for most projects implemented from 1970 through 1984). USAID 1993, appendix B (for most projects implemented from 1984 through 1991). The funding reflects only USAID grants and loans, not funds from host countries or other sources. Funding information was not available for a number of projects, and therefore the level of project funding is underreported in the table.

[b]A.I.D. (1993) appendix B (for activities implemented between 1980 and 1991); Tilney and Block (1991), Exhibit 2.2. This category includes hybrids such as the African Economic Policy Reform Program.

[c]World Bank (1992a), Table A1.5. Agricultural sector loans include Agriculture SECALs. Data are for all SALs, although only 60 percent of SALs have agriculture pricing components.

analysis and planning. Such projects accounted for about $660 million of total expenditures.

A much greater proportion of expenditures, about $2 billion (including PL 480 food aid), was committed to conditionality programs (including hybrid projects that addressed both planning and policy reform). Most of the Agency's agricultural adjustment programs (37 of 52) have been concentrated in Africa, where the largest number of USAID recipient-countries are located and where the need for adjustment programs is greatest. By contrast, USAID's capacity-building projects are distributed more evenly across Africa, Asia and the Near East, and Latin America and the Caribbean.

The World Bank has invested more than $5 billion in agricultural-sector adjustment loans over the past decade or so that stress policy conditionality. In addition, the Bank has invested more than $15 billion in structural adjustment loans since 1980. Sixty percent of them contain conditionality related to agricultural pricing (Knudsen and Nash 1991).

Effect of USAID Investments in Agricultural Policy Reform and Planning

Tilney and Block (1991) examined 19 USAID-financed initiatives in agricultural policy and planning implemented in the 1980s. Among them, 6 dealt exclusively with capacity building and 3 exclusively with policy reform; 10 were hybrids, addressing both capacity

building and policy reform. Only 39 percent succeeded in inducing policy reform. Excluding the six capacity-building projects, 50 percent brought about policy reforms.

Wolgin (1990) looked at USAID's experience with agricultural policy reform in Africa. From 1984 through 1989, USAID funded 42 policy reform programs in 22 countries, totaling more than $760 million. Of these programs, 17 were designed specifically to support agricultural policy reform. The policy reform programs attempted to liberalize agricultural output markets and fertilizer markets. In many cases the results were positive:

Mali. The operating deficit of the cereals marketing board was reduced, grain storage losses were reduced, and private trade in cereals was expanded. As a result, rural consumers gained improved access to cereals.

The Gambia. The government decontrolled rice prices, legalized private importation of and trade in rice, and eliminated the export tax on groundnuts. These measures resulted in reduced government expenditures on subsidies and expanded rice supplies.

Madagascar. The government liberalized rice marketing. As a result, the farmer received, on average, 66 percent of the retail price after the reform, compared with only 41 percent of the retail price before reform.

Mozambique. The government was persuaded to eliminate price and trade controls on fruits, vegetables, roots, and tubers. Afterwards, real producer prices increased and real consumer prices declined.

Cameroon. The government slashed fertilizer subsidies by 75 percent, and a private market was established for the import, distribution, and financing of fertilizer. Absent government control, marketing margins for fertilizer fell from $283 a ton in 1987 to $49 a ton in 1989.

Uganda. Policy reform measures provided incentives for exporters to purchase nontraditional export commodities. As a result, exports doubled (in terms of value) during 1988–90.

Other programs were relatively unsuccessful or even outright failures:

Zambia. USAID suspended the second disbursement of its planned contribution to a World Bank program designed to eliminate food and fertilizer subsidies when the government abandoned the program.

Togo. An export liberalization program had minimal impact.

Guinea. A program designed to privatize two parastatals involved in distribution of fertilizer and other agricultural inputs failed.

Results of still other programs were mixed:

Malawi. USAID failed, on the one hand, to persuade the government to reduce fertilizer subsidies permanently, and the subsidies rebounded to earlier levels after only two years. On the other hand, USAID succeeded in promoting a shift in the mix of imported fertilizers. As a result, fertilizer nutrient sales increased by 100 percent from 1985 to 1990, even though the tonnage increased by only 55 percent. The shift to high-concentration fertilizers saved $18 million in transportation and fertilizer costs.

Kenya. Although the government was persuaded to decontrol fertilizer prices and reduce its role in fertilizer distribution, it could not be induced to withdraw completely from the system.

From 1985 through 1990, USAID committed $308.8 million to 19 countries under the African Economic Policy Reform Program. Lieberson (1991) also evaluated the Agency's experience with policy reform in Africa. Like Wolgin, Lieberson reports generally positive results. But empirical evidence concerning the actual effect of these results is limited to that summarized above. Overall, it appears that USAID support was successful and accelerated liberalization of agriculture in those countries where the government was genuinely committed to reforms.

Results of World Bank Adjustment Operations

Knudsen and Nash (1991) reviewed 79 World Bank–financed adjustment loans in agriculture. Agricultural pricing conditions (usually, increases in producer prices) were incorporated into most structural adjustment loans (about 60 percent) and virtually all sectoral adjustment loans. In addition, of the 79 SALs and SECALs, 48 percent included macroeconomic policy conditions related to agriculture (usually, exchange rate reform). These conditions were judged to be successfully implemented in 69 percent of the cases. The study does not, however, report on the specific impact of successfully implementing these conditions. As in most other studies, Knudsen and Nash simply suggest that agricultural growth increased more in countries receiving adjustment loans than in comparable countries not receiving adjustment loans.

McCleary (1991) reports that about 60 percent of the policy changes agreed to as conditions of SALs and SECALs were fully implemented. Among the areas where implementation was most successful were agricultural pricing policies and exchange rate policies, which are critical to improving agricultural terms of trade. Again, actual impacts of the policy reforms were not reported.

A World Bank report by Humphries and Jaeger (1989) compares the agricultural performance of African countries that have undertaken donor-assisted structural adjustment with countries that have not. The authors show that devaluation and other policy reforms resulted in increases in real producer prices for export crops by nearly 50 percent from 1980 through 1986; in nonreforming countries, the increases were small. Similarly, the growth rate of agricultural production more than doubled from 1980–84 through 1985–87 in countries that adopted important reforms; in countries without reforms, agricultural growth rates stagnated at the low levels prevailing in both groups of countries in the early 1980s.

Cleaver (1988, 49) comes to similar conclusions: aggregate agricultural production was significantly higher in adjusting countries than in other countries. That suggests that, overall, "where policy is good or improving, performance of agriculture is also good or improving." Table 4 shows a much higher rate of agricultural growth in African countries adjusting intensively in 1987–90 (3.7 percent) compared with countries adjusting less intensively (2.2 percent) or countries not adjusting at all (0.5 percent). The numbers suggest a clear relationship between adjustment operations and agricultural growth.[5]

The close relationship between the macroeconomic environment and agricultural development is highlighted in a comparative study of agricultural price interventions in 18 developing countries. The study (Krueger, Schiff, and Valdes 1988) showed that the *indirect* tax on agriculture from macroeconomic and industrial protection policies averaged 22 percent for the 18 countries from 1960 through 1985—nearly three times the *direct* tax on agriculture from agricultural pricing policies, which was 8 percent. The study concluded that policy discrimination against agriculture in developing countries was caused mainly by currency overvaluation. In 1990 the World Bank (1990b, 110) concluded that macroeconomic policy reform is essential for agricultural development and that donor attempts to encourage macroeconomic reform are as important to agriculture as are their attempts to influence agricultural policy directly.

[5] These results have been reconfirmed in the most recent and most detailed World Bank study on the subject, *Adjustment in Africa: Reforms, Results, and the Road Ahead.*

Table 4. Average Agricultural Growth Rates in Africa, 1980–90 and 1987–90, in Adjusting and Nonadjusting Countries

Countries	1980–90 (percent)	1987–90 (percent)
Countries adjusting intensively, 1987–90 (13)[a]	2.7	3.7
Countries adjusting less intensively, 1987–90 (15)[b]	2.7	2.2
Nonadjusting countries (5)[c]	negative	0.5

Source: Cleaver 1988, 50.

[a]Côte d'Ivoire, Ghana, Guinea-Bissau, Kenya, Madagascar, Malawi, Mauritania, Mauritius, Nigeria, Senegal, Tanzania, Togo, and Zambia.

[b]Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo, Gabon, the Gambia, Mali, Niger, Sierra Leone, Somalia, Sudan, Zaire, and Zimbabwe.

[c]Botswana, Ethiopia, Lesotho, Liberia, and Rwanda.

In 1992 the World Bank's Operations Evaluation Department reviewed the performance of seven completed agricultural SECALs with commitments totaling $988 million (of which $52 million was eventually canceled). Three were in Africa; two in Latin America; one in Asia; and one in the Middle East. Only two were deemed sustainable, and none was judged to have attained its institutional objectives in a substantial way. The review concluded that sector operations whose effectiveness is subject to macroeconomic policy reforms (as is often the case with the agriculture sector) should not be expected to produce results unless both macro and sectoral reforms are carried out simultaneously (World Bank 1993a, 26).

Lele (1991) concludes that the World Bank has had limited success in persuading countries to undertake changes when their leaders were opposed. For example, Kenya has been reluctant to liberalize grain marketing; Tanzania, to adjust the foreign exchange rate; Malawi, to limit licensing of land for estates; and Senegal and Nigeria, to remove fertilizer subsidies.

Overall, most literature on World Bank agricultural adjustment loans indicates results have been fair to good. Knudsen and Nash's work shows that 68 percent of agricultural pricing conditionalities have been met. The work of Humphries and Jaeger and that of Cleaver indicate that, on average, reforms pay dividends. Still, as Islam (1991) points out, most studies deal insufficiently with the impact of these reforms on agricultural performance. Instead, they focus on whether the reforms were implemented. "Still urgently needed," he asserts, "is an empirical analysis of how the reforms were actually implemented and what their impact was on the agricultural sector."

Results of USAID Planning and Policy Analysis Activities

Over the past 30 years, USAID has been the principal bilateral donor funding projects to help build local capacity in agricultural planning and policy analysis. From 1979 through 1984, USAID sponsored at least 129 agricultural policy and planning projects with total funding of $475 million (of which USAID contributed $278 million).[6] Table 5 shows the re-

[6] During the longer period 1960 through 1993, USAID funded 169 planning and policy analysis projects with total expenditures of $664.2 million (see table 3).

Table 5. USAID Projects in Planning and Policy Analysis, by Region, in $ Millions, 1977–84

Region	Number of Projects	Expenditures
Africa	40	193
Asia	16	120
Latin America/Caribbean	63	94
Near East	5	68
Total	124	475

Source: Tilney and Block 1988c, 3–4.

gional distribution of 124 of these projects, those for which funding information was available. The projects were designed to provide the analytical basis for policy reform (as distinct from financial support of policy reform) as well as to strengthen institutions.

Institution building. In their extensive review of 129 projects, Tilney and Block (1988b, 8–10) analyzed 61 that had been formally evaluated. Of that number, 58 (95 percent) were judged to have had successful capacity-building results—in creating a policy analysis or planning unit, adding new qualified staff, or upgrading existing staff—and 24 (39 percent) had distinct effects on decision-makers.

Their more detailed examination of 15 capacity-building projects showed that 7 had a high degree of success (Egypt, the Gambia, Morocco, Pakistan, Peru, Sri Lanka, and Zambia). Eight were less successful (the Dominican Republic, Ecuador, Indonesia, Kenya, Niger, Sudan, Togo, and Zaire) (Tilney and Block 1988b, 8–10). Only 1 of the 15 (the Gambia) had much effect on decision-makers; projects in Ecuador and Togo had little impact at all (Tilney and Block 1991, 10).

The evaluation literature identifies six factors that have contributed to successful institution building in planning and policy analysis projects: 1) project staff, both expatriate and host country, are competent; 2) incentives are in place to recruit and retain qualified host country staff; 3) the right kind of training, including on-the-job training, is provided, and well-qualified trainees are selected; 4) physical equipment, such as computers, is provided; 5) the analytical work addresses the country's policy needs; and 6) results of the analyses are widely disseminated.

Too often these factors are not present. Examples: In identifying expatriate staff, donors often give too much emphasis to technical skills and too little to teaching and management ability. . . . Host countries often select counterparts on personal or political, rather than professional, grounds. . . . Civil service pay scales are not high enough to attract and retain qualified analysts. . . . Trainees are often selected not on their qualifications but through influence. . . . On-the-job training may be inadequate—a circumstance that perpetuates dependence on expatriate personnel.

Policy reform. USAID's planning and policy analysis projects have had less success in achieving policy change than in achieving their institution-building objectives. Of the 61 projects evaluated, only 20 contributed to actual changes in policies or programs. Their effectiveness in changing policies varied considerably among regions. In Asia and Latin America and the Caribbean, 42 percent of the projects brought about policy changes—nearly double the 22 percent that had policy effects in Africa. In the Near East, no project succeeded in effecting policy changes (Tilney and Block 1988b).

Absence of actual policy change does not necessarily mean that the policy analysis and planning activities failed. Even with the highest quality analysis and the best decision-maker access, policies may not change in the short term. Thus, although only one third of the projects produced concrete policy change, most of those remaining may still have been successful in producing high-quality analysis

and in providing useful input to decision-makers for future reforms.

The evaluation literature identifies four factors that actually induce policy change: 1) the host country supports the change; 2) analysis meets the needs of policymakers by addressing immediate policy issues and by providing direct, practical, implementable recommendations; 3) the policy analysis unit is situated close to senior decision-makers; and 4) policy advisers perform high-quality analysis and have credibility with and access to policymakers.

Sometimes these factors are not present. Examples: Because governmental leaders often resist analyses that challenge or expose the limitations of existing policies, the analyses are unlikely to produce short-term results. . . . Large, quantitative, highly abstract modeling exercises have little payoff in policy change because they fail to meet the tests of practicality and relevance. . . . Policy analysis units are often isolated from the entity having prime authority in setting agricultural policies—often a ministry of finance or planning.

The following are observations on planning and policy analysis projects that were successful:

Bangladesh and the Gambia. The projects had considerable influence on decision-makers.

Zambia. Virtually all trainees returned to responsible policy and planning positions, and the analytical unit participated in the decision-making, which resulted in, among other things, price increases for groundnuts and reductions in tractor rental subsidies.

Sri Lanka. Policy analysts had access to decision-makers, the analytical agenda met government needs, and the analyses were practical. These factors led to specific policy changes along with steps for their successful implementation.

Peru. The analytical unit dealt with current high-priority policy issues. As a result, it participated in several ministerial decisions.

Botswana. The project supported successful on-the-job training.

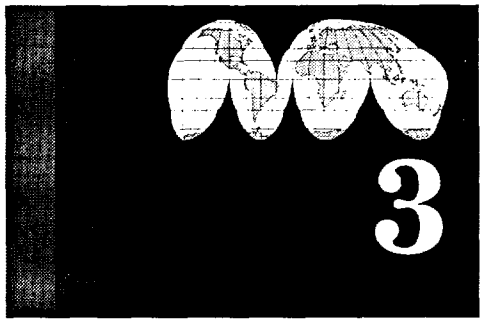
Dominican Republic. The agricultural studies unit took part in the decision-making process, and policy studies were responsible for decisions to raise the producer price of milk and decontrol pork prices.

Other planning and policy analysis projects were less successful:

Indonesia, Togo, and Ecuador. There was little influence on decision-makers.

Kenya. There was a strong effect on decision-makers, but poor on-the-job training created dependence on foreign technical assistance.

Zaire. Accomplishments were close to nil (Bucknall and Gutman 1989, 20).



3 Agricultural Technology Development and Diffusion

TECHNOLOGY DEVELOPMENT expands currently known agricultural techniques. It begins with agricultural research to develop new technology. Then various extension or diffusion techniques transfer the newly available production technology to farmers.[7]

Successful technology development and diffusion contribute to agricultural growth by increasing the value of output. The increase is usually due to an increase in the total production of goods and services or to an increase in productivity (efficiency of production). In addition to boosting agricultural growth, successful technology development and diffusion enhances consumer welfare. Techniques that increase the quantity of agricultural output often result in lower market prices for those products. Theoretical and empirical evidence shows that most benefits from agricultural technology development and diffusion accrue to consumers (Norton and Davis 1981, Hayami and Herdt 1977).

Education is the third component (together with research and extension) of the tripartite U.S. land-grant model of agricultural technology development and diffusion. Two types of agricultural education affect technology development and diffusion: 1) education of farmers and 2) higher education of scientists and researchers. USAID investments have aimed at the latter.

Funding of Agricultural Technology Development and Diffusion

Overall public expenditures on agricultural research in developing countries have increased from $2.5 billion a year in 1971–75 to more than $4.3 billion a year in 1981–85 (in 1980 dollars) (table 6). Expenditures have been substantially greater in the Asia/Near East region than in either the Africa or Latin America/Caribbean regions.

In most developed countries, technology transfer from researchers to farmers takes place rapidly and effectively. The primary mechanisms are public bodies such as the Cooperative Extension Service (in the United States) and private firms through their sales efforts. The process is a continuum, and it is difficult to determine where research ends and extension begins.

The situation is quite different in most developing countries. Compared with developed

[7] This section is based on a synthesis prepared by James F. Oehmke, *Issues of Agricultural Technology Development and Diffusion: A Synthesis of the Literature.*

Table 6. Annual Public Expenditures on Agricultural Research, by Region, in 1980 $ Millions, 1971–85			
Region	1971–75	1976–80	1981–85
Sub-Saharan Africa	277	359	372
Asia/Near East	1,788	2,546	3,253
Latin America/Caribbean	487	679	709
Total	2,552	3,584	4,334

Source: Pardey and Roseboom 1989.

countries, extension workers in developing countries 1) often have little to extend and 2) must service a larger number of farm units, particularly poor farmers on small holdings. They are usually male, and they most often contact male members of farming families, even though women do much of the farming. They are usually city-born and -bred and have little practical knowledge of farm conditions. Funding of public extension services is often inadequate, with the result that extension workers suffer from low pay, inadequate equipment, and limited operating expenses needed to visit the countryside. In contrast to developed countries, private sector firms carry out relatively little extension work.

Before World War II, few resources were invested in creating or improving institutions of agricultural higher education in developing countries. Consequently, these countries faced a severe shortage of agricultural technicians and scientists, particularly in research and extension. In many countries expatriate staff filled these positions.

In 1952 the United States began investing in development of agricultural universities in developing countries. Large numbers of U.S. faculty were sent on long-term overseas assignments to host country universities to help establish or improve education and research programs. Similarly, thousands of host country faculty were sent to American universities for advanced degrees in the agricultural sciences. By 1989 such assistance had been provided to 64 universities in 40 countries. The largest university development programs were undertaken in Brazil, India, Indonesia, and Nigeria (Hansen 1989).

Typically, a host country university was paired with a U.S. land grant university. Universities from 36 states were used as contractors, and these universities helped to instill the tripartite institutional model (research, extension, and education) common in the United States. Many of the 40 countries made substantial progress. The new institutions, however, were often not able to implement the farmer-controlled land-grant model, partly because the U.S. system did not match the institutional models inherited under former European colonial rule (particularly from the British and French).

Most agricultural university development projects (50 of 64) were initiated in the 1950s and 1960s (table 7). Projects were concen-

Table 7. Number of USAID-Supported University Development Projects, by Region and Decade of Initiation				
Decade Project Began	Africa	Asia/ Near East	Latin America/ Caribbean	Total
1950s	1	18	6	25
1960s	9	8	8	25
1970s	0	2	1	3
1980s	4	5	2	11
Total	14	33	17	64

Source: Hansen 1989.

trated in Asia in the 1950s but were more regionally balanced in the 1960s. This type of investment was virtually abandoned by the United States in the 1970s. It was resumed in the 1980s, but the average size of the later projects was much smaller.

Impact of Investments in Agricultural Technology Development and Diffusion

Research

A single finding from the literature overwhelms all others: investments in agricultural research have generated high economic rates of return, indicating that the social benefits of the investments justify the costs in virtually all countries, for a wide variety of commodities, and under diverse agronomic and climatic conditions.

Table 8 presents the results of some of the studies on which this finding is based. The studies are part of the considerable academic literature that has evolved over the past 3 decades, as distinct from the evaluation literature. In fact, USAID evaluations usually do not calculate rates of return to investments in research, and World Bank projects in research are accorded specific exclusion from usual Bank practice, which is to calculate rates of return.

Because these studies were done by different analysts, the methods vary somewhat. For example, some analyses looked at a single crop, while others examined an aggregate of crops in a country, thereby removing any bias toward selecting only successful ventures. Some included the cost of extension and others did not. The time period varied from study to study; the longest time period ever studied spanned the years 1800 through 1938 in Japan. There the economic rate of return was 35 percent for aggregate investments in agricultural technology development and diffusion. In most cases the analysis covered the entire country, but in some cases it covered only a region, and in others it covered several countries. Some analyses were ex ante (based on anticipated changes), but most (including all in table 8) were ex post (based on past performance).

For virtually all studies, the economic rate of return exceeded the opportunity cost of capital—what the money could have earned in the next best investment—indicating that the investments were economically justified. For Africa, although most studies showed investments in agricultural research were justified, there were some exceptions. In fact, the negative rates of return found in a few studies were unique to Africa.

The findings of high returns across most countries and commodities has led most reviewers to conclude that investment in agricultural research is worthwhile (Evenson, Waggoner, and Ruttan 1979; Ruttan 1982; Echeverría 1990; Norton and Davis 1990). Still, skeptics have raised methodological questions.

Some, for example, have argued that the studies examined only the success stories and consequently neglected to account for the costs of failed research programs. But even when failed programs are included in aggregate studies, which include all benefits and all costs, rates of return remain high.

Some have argued that the early studies failed to account for the effect of technology development and diffusion on prices. They suggest that successful programs lowered prices, which would reduce benefits to farmers. However, when price effects are accounted for properly, the lower prices typically benefit consumers more than they harm producers (Hayami and Herdt 1977). In any event, this is an issue of transfers, not an issue of real returns to society.

Others have argued that the effect of research was hard to distinguish from that of extension and complementary activities. The

Table 8. Economic Rates of Return to Investments in Agricultural Technology Development and Diffusion, Selected Countries and Crops, by Region

Country	Commodity	Years	Inclusion of Extension Costs	Rate of Return (percent)
		Africa[a]		
Africa (regional)	maize/staple crops	1962–80	no	30–40
Cameroon	cow pea	1979–91	yes	3
Cameroon	sorghum	1979–91	yes	negative
Ghana	maize	1982–92	no	74
Kenya	wheat	1922–80	no	33
Kenya	maize	1955–88	no	40–60
Malawi	maize	1957–92	yes	4–7
Mali	maize	1969–91	yes	135
Niger	cow pea/millet/sorghum	1975–91	yes	negative
Senegal	cow pea	1980–85	yes	31–92
Zambia	maize	1978–91	yes	84–87
		Asia and the Near East[b]		
Bangladesh	rice and wheat	1961–77	—	30–35
India	aggregate	1953–71	yes	40
Indonesia	rice	1965–77	—	133
Japan	rice	1915–50	—	25–27
Japan	rice	1931–60	—	73–75
Pakistan	wheat	1967–81	—	58
Pakistan	maize	1967–81	yes	19
Philippines	rice	1966–75	—	75
Philippines	maize	1956–83	no	27–48
Philippines	maize	1956–83	yes	27–43
		Latin America[c]		
Argentina	aggregate	1950–80	yes	41
Bolivia	wheat	1966–75	—	48
Brazil/Central	rice	1959–78	yes	87
Brazil/Embrapa[c]	wheat	1974–82	—	59
Chile	wheat	1949–77	—	21–28
Chile	maize	1940–77	—	32–34
Colombia	rice	1957–72	—	60–82
Colombia	wheat	1953–72	—	11–12
Mexico	wheat	1943–63	—	90
Mexico	maiz	1943–63	—	35
Peru	maize	1954–67	—	35–40
Uruguay	rice	1965–85	yes	52

[a] From Oehmke 1992.
[b] Adopted from Echeverria 1990 and Daniels, et al. 1992
[c] Brazilian Agricultural Research Enterprise.
Note: When inclusion of extension costs is not specified the presumption is they were excluded. However this does not necessarily mean the rate of return has been overestimated. Some analyses (for example maize in Kenya) disaggregated the benefits of research and extension and then compared the benefits and costs of research alone.

answer to that course of reasoning is that high rates of return are robust even when the costs of extension and complementary inputs are accounted for.

Still others point out that *average* rates of return fail to show that the last dollar spent on research was productive; for example, they do not show that a successful program costing $5 million would not have been just as successful at a budget of $4.5 million. More recent studies have used the marginal approach, but even for the earlier studies, there is no easily discernible difference in results between average rates of return compared with marginal rates of return.

As would be expected from these high rates of return, improved agricultural technologies have spread substantially, even in Africa. Examples:

- In Zambia a new hybrid maize variety released in 1983 gave a 20 percent yield increase over the then popular variety. Aided by appropriate pricing policies, the new variety reached 50 percent of total maize area by 1988–89. Then, despite a reversal in pricing policies, use of the new variety increased to 58 percent of total maize area in 1990–91 and to 61 percent in 1991–92.

- In Malawi, farmers adopted a new maize variety with a 100–200 percent yield advantage over the 1-ton-per-hectare yield of local varieties. Land planted in the new variety increased from about 5 percent of total maize area in 1985–86 to almost 15 percent in 1991–92.

- In Ghana, use of improved maize varieties increased from 20 percent of total area planted to maize in 1982 to 55 percent in 1991. Adoption of the new variety contributed to an increase in production from 265,000 tons in 1982 to 932,000 tons in 1991.

- In all of sub-Saharan Africa, 35 to 50 percent of the total maize area was planted in improved varieties in 1992 (Byerlee 1992).

- Cow pea varieties released since 1982 have been adopted on 100 percent of the cow pea area in the Guinean zone of Burkina Faso and 95 percent of north-central Mali (Sanders 1993).

Extension

USAID's extension experience falls into three phases (Cummings 1989). During the first phase, in the 1950s and 1960s, extension was a high priority. USAID provided broad support for development of national extension systems. The Agency mobilized thousands of professionals to establish and expand American-style extension institutions throughout the developing world.

This phase ended in the early 1970s, with the Agency largely abandoning efforts with large-scale extension systems. Other donors, notably the World Bank with its training and visit system, took the lead in promoting national systems. In contrast, USAID began, in the second phase, to integrate extension into rural development activities. The Agency supported an increasing number of farming systems projects—an attempt to bridge research and extension through closer on-farm interaction with farmers.

By the end of these two phases, agriculturalists and others recognized that extension agents were visiting farmers with little useful information to offer. They also saw that even with a reasonably well organized extension service, a continuing stream of improved technology was necessary to increase rural incomes. Without improved technology to increase yields and lower unit costs, there was little to transfer. Thus the research function was essential. Developing countries mostly lacked such research capacity, and because of different growing conditions, industrial-country technologies could not be transplanted directly to them. In the United States, for example, establishment of state experiment stations and research at the Department of Ag-

riculture preceded *by decades* establishment of public extension work.

The third phase of the Agency's extension experience began in the late 1980s. Improvements to extension systems became part of a wider agricultural development strategy that included support for policy reform, agricultural research, private sector growth, and rural resource mobilization. USAID rarely supports large-scale extension systems. They have a high cost and abound in bureaucratic hurdles. Besides, other agricultural investments have greater payoffs. Nonetheless, USAID continues to support selective improvements in public extension institutions, including use of mass communications technology and private sector efforts to transfer technology.

Education

Most of the host country faculty trained by USAID returned to their home universities and emerged as primary leaders in expanding the supply of trained agriculturalists. The agricultural universities and faculties supported by USAID became major sources of trained manpower in the agricultural sciences. Many of these universities also led development of new agricultural production technologies. Some larger universities, such as those in India, Indonesia, and Thailand, have been able to support significant levels of applied research. In contrast, the research role of smaller universities, such as those in Malawi, Ethiopia, and the Dominican Republic has been much more limited (Hansen 1989).

Underfunding of agricultural universities and faculties is weakening their research and education programs, thereby placing in jeopardy their long-term institutional sustainability. As a result, the effect of these U.S. investments in agricultural universities is unclear. Most universities have not been involved in significant extension roles, because government line agencies have tended to guard this function for themselves. As suggested above, however, public sector extension does not appear to have had much positive effect on the diffusion of new crop varieties. In fact, the high-yielding varieties of wheat and rice spread rapidly and widely in much of Asia without a major organized extension contribution. The lesson was that technologies that offer significant improvement in economic returns will spread quickly among farmers through example. "The best extension agent,"

Table 9. Average Yields (kg/ha) for Rice, Wheat, and Maize, by Region, 1960–61 and 1990–91

Region	Rice		Wheat		Maize	
	1960–61	1990–91	1960–61	1990–91	1960–61	1990–91
Africa	1,120	1,602	595	1,394	900	1,174
Latin America	1,790	2,634	1,095	2,080	1,165	2,008
Far East	1,700	3,558	840	2,594	930	3,316
Near East	2,875	4,564	950	1,844	1,550	4,383
North America	3,835	6,248	1,520	2,408	3,285	7,116
World	1,980	3,516	1,230	2,526	2,055	3,712

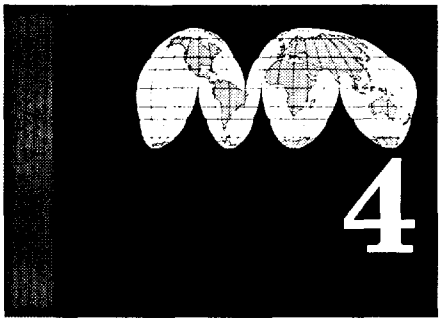
Source: FAO, *Production Yearbook,* vols. 15 and 45 (1961 and 1991).

the saying goes, "is looking over your neighbor's fence."

State of Agricultural Technology Development and Diffusion

Two key indicators of the state of agricultural technology development and diffusion are 1) changes in on-farm yields and 2) the gap between on-farm yields and potential yields. From 1960–61 through 1990–91, average yield increases for the major staple crops (rice, wheat, and maize) have been substantial, doubling in many parts of the world. In fact, yields of *all three* crops more than doubled in the Far East. Average yields are, however, still well below potential; there is still a gap between on-farm yields and potential yields. Among developing countries, the gap appears greatest in Africa.

Table 9 shows that over the period 1960–61 through 1990–91, rice yields increased by 78 percent worldwide. In the Far East they more than doubled. They increased least in Africa; in fact, rice yields in the other regions of the world were higher in 1960–61 than they were in Africa in 1990–91. (In Cameroon, an exception, rice yields increased fourfold.) In the case of wheat, yields more than doubled, even in Africa. In Africa, though, they remain far below levels in other parts of the world. Finally, maize yields also increased dramatically, even in countries (such as the United States) that had already adopted hybrids before 1960. Again, Africa has shown the least progress. These increases are attributable largely to 1) improved varieties resulting from agricultural research, 2) development of irrigation, and 3) increased use of chemical fertilizers.



4 Rural Infrastructure

INFRASTRUCTURE DEVELOPMENT involves creation of public goods (which are also durable capital goods). These public capital goods normally produce external economies and social benefits (as distinct from private benefits). As a result, when one individual uses the services provided by these public goods, that does not prevent other individuals from using and benefiting from the same services. Examples of public capital goods, or physical infrastructure, include public utilities (waterworks, telephone, electricity), transport facilities (roads, bridges), and health and education facilities (hospitals, schools). Infrastructure is sometimes referred to as *social overhead capital.*[8]

Four characteristics help to distinguish infrastructure, which contributes *indirectly* to economic growth, from investments that are *directly* productive (such as fertilizer): 1) the services provided by infrastructure facilitate, or are in some sense basic to, carrying out a wide variety of economic activities; 2) they are provided in practically all countries by public agencies or by private agencies subject to public control and thus are provided free of charge or at rates that are publicly regulated; 3) the services for the most part cannot be imported; and 4) investments in infrastructure tend to be indivisible or lumped together.

Infrastructure, whether for agriculture or industry, rural areas or urban areas, provides the basic environment for investments in directly productive activities. Ahmed and Donovan (1992) examine *rural* infrastructure, which provides the basic environment for investments in *agriculture*. Specifically, they zero in on rural roads, rural electrification, and to a lesser extent irrigation.

Impact of Investments in Rural Infrastructure

Economists and others have tried to evaluate how rural infrastructure affects agricultural production. Because infrastructure typically contributes only indirectly to economic growth, it is difficult to measure the magnitude of that contribution. (For this reason, it is also difficult to determine what level of resources should be allocated to infrastructure activities relative to directly productive activities.)

For example, rural roads make it possible (or less expensive) to distribute fertilizer and other agricultural inputs. Fertilizer, in turn,

[8] This section is based on Raisuddin Ahmed and Cynthia Donovan, *Issues of Infrastructural Development: A Synthesis of the Literature,* November 1992. It examines physical infrastructure, as distinct from institutional infrastructure. The study is based on a review of 185 documents, including research studies, project evaluations and appraisal reports, and other books and articles.

contributes directly to increased agricultural productivity and incomes. But in trying to explain why agricultural productivity and incomes increased, it is difficult to disentangle the effect of the fertilizer from the effect of the rural road that made the distribution of fertilizer possible in the first place. Rural roads also make it possible to move food from surplus to shortage areas—a contribution important for an efficient economic system and for food security.

Similarly, rural electrification makes it possible to operate electric pumps for irrigation. Irrigation, in turn, contributes to increased agricultural productivity and incomes. But, again, in trying to explain why agricultural productivity increased, it is difficult to disentangle the effect of rural electrification from that of the irrigation that was made possible by electrification. Rural electrification also makes it possible to operate machinery typically needed, for example, by rice mills to process the increased production resulting from use of irrigation.

It is important to understand these difficulties when reviewing the evidence below. Aggregate production studies all indicate that infrastructure variables, when included in the analysis, play an important part in explaining production technology choices and output increases. Two examples:

1. Binswanger et al. (1987) used annual data (1969–78) for 58 countries to carry out both cross-country and within-country time-series analyses. They found that a) a 10 percent increase in road density results in a 2.4 percent increase in fertilizer demand, and b) a 7 percent increase in agricultural production and fertilizer use during a 10-year period could be attributed solely to roads.

2. Antle (1983) analyzed 1965 data for 47 less developed countries and 19 developed countries. After controlling for other explanatory variables, he found a strong positive relationship between infrastructure (transportation and communications) and aggregate agricultural productivity across both developed and less developed countries.

Village-level studies add to the body of evidence provided by the aggregate production studies:

1. Analysis of 108 Indian villages from 1966 through 1980 by Barnes and Binswanger (1986) showed rural electrification has a direct and positive effect on well irrigation (but not on gravity-fed irrigation) and multiple cropping. In addition, availability of electricity stimulated growth of rural grain mills: not only did electricity enable mills to operate in the first place, but through irrigation, it contributed to increased agricultural production. That in turn stimulated increased demand for milling services.

2. A study of India by Binswanger, Khandker, and Rosenzweig (1989) used data from 85 districts from 1960–61 to 1981–82. Consistent with Binswanger's 1987 study, this study found that a) a 10 percent increase in roads (measured as total road length) resulted in a 2.2 percent increase in fertilizer demand; b) 7 percent of the growth in aggregate output and 7 percent of the growth in fertilizer use can be directly attributed to road investments; and c) growth in fixed irrigation investments can be directly attributed to electrification investment, increasing aggregate output by about 2 percent.

Farm-level studies show similar results:

1. Using data for the Philippines from 1948 through 1984, Evenson (1986) showed that a 10 percent increase in roads (measured as the number of miles per 1,000 arable hectares) resulted in a 3 percent increase in agricultural production. Much of the increase was generated through increased use of fertilizer and reduced transport costs. In contrast, a negative relationship existed between rural electrification and agricultural production. It could not be explained.

2. Using 1982 data for Bangladesh (and controlling for the effect of agroecological factors), Ahmed and Hossain (1990) found that

farms in villages with relatively well developed infrastructure a) used greater amounts of fertilizer (150 kilograms per hectare compared with 78 kilograms per hectare in areas with poorly developed infrastructure, b) had more land under irrigation (42 percent compared with 21 percent), c) had more of their land under high-yielding varieties (42 percent compared with 25 percent), d) marketed 36 percent more of their agricultural production, and e) had 12 percent higher rural wages and wage income.

3. A study cited by Cecelski and Glatt (1982) found that irrigation explains 54 percent of the total variance in agricultural production in India as a whole. Policymakers in India recognize irrigation as the most important rural use of electricity.

The International Food Policy Research Institute (IFPRI) reviewed 45 donor appraisals and evaluations of projects in transport, electrification and irrigation, and integrated rural development (which often includes investments in rural roads and rural electrification). Some had been implemented as long ago as the early 1950s, and others more recently. Some evaluations included estimated rates of return; therefore, unlike the research studies on production benefits reported above, they took both costs and benefits into account. Among IFPRI's findings:

1. A World Bank Mexican roads project reviewed by King (1967) reported an estimated economic rate of return of 11–18 percent, depending on the road section analyzed. The rate of return increased to 20 percent if other "unquantified" benefits were added.

2. A World Bank roads project in El Salvador was estimated to have a benefit–cost ratio of 3:1 owing to increased shrimp marketing and cotton production anticipated as a result of the roads.

3. A USAID rural roads project in Liberia evaluated by Cobb et al. (1980) reported estimated economic rates of return ranging from 7.9 to 23 percent, depending on alternative construction and maintenance projections. The evaluation also found that vehicle operating costs fell by 90 percent as a result of the roads.

4. For Bangladesh, Hossain and Chowdhury (1984) reported that roads contributed to a) user savings and increased traffic as a result of lower transport costs; b) increased investments in irrigation and technology and increased use of modern agricultural inputs, with correspondingly higher agricultural productivity; c) higher producer prices for outputs, and lower input prices; d) greater cultivation intensity; and e) more frequent contact with extension officials.

5. The multidonor Kenya rural access roads program, evaluated by Asfaw (1980), showed high benefits associated with labor-intensive roads (as distinct from those built with conventional capital-intensive techniques). Labor-intensive roads had an estimated economic rate of return of more than 30 percent, even though some benefits were not included.

The IFPRI synthesis also looked at relevant books and articles. Saith (1986) notes that Taiwan and Korea share similar growth paths and historical backgrounds. In Taiwan, however, about 80 percent of rural income is received from nonfarm sources, compared with less than 48 percent in Korea. This difference can perhaps be attributed in part to differences in rural electrification and rural roads in the two countries. In Taiwan, 70 percent of farm households had access to electricity, even in 1960. That compares with only 13 percent in Korea. Moreover, in Taiwan, density of paved roads was 76 kilometers per 1,000 square kilometers in 1962 and 215 kilometers in 1972. In Korea, road density was less than 10 kilometers in 1966 and less than 50 kilometers in 1975.

State of Infrastructure

Since few data exist concerning infrastructure development in developing countries, IFPRI carried out a survey in seven countries in Africa (Benin, Kenya, Malawi, Senegal,

Tanzania, Togo, and Zimbabwe) and five countries in Asia (Bangladesh, India, Pakistan, the Philippines, and South Korea). Comparing results across the two continents reveals that infrastructure development is much more advanced in Asia than in Africa. That may help explain the more rapid agricultural growth that has occurred in Asia. Among IFPRI's findings:

1. The extent of transport and communication infrastructure (road and railway mileage per 1,000 hectares of cultivated land) in 1989 in the African countries was about one third that in the Asian countries.

2. Asian roads in 1989 had almost four times greater vehicle density than African roads.

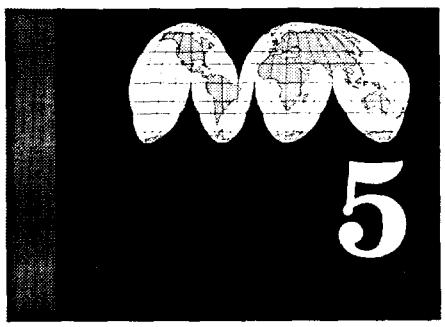
3. In African countries for which data were available, only 3–5 percent of villages had electricity in 1990; in the Asian countries, excluding Bangladesh, roughly 50 percent of the villages had electricity. But even in Bangladesh, the proportion of villages electrified was double that of Zimbabwe (the most advanced of the African cases).

4. Development expenditure for transport and communication in African countries is about half that in Asian countries when measured by cultivated land per hectare.

Road statistics of the International Road Federation (1988) confirm these differences:

1. For African countries for which data are available, road densities range from 0.01 to 0.11 kilometer per square kilometer of land area. In Asia, road densities range from 0.35 to 0.41 kilometer per square kilometer.

2. The percentage of paved roads is much larger in Asia (35 percent) than in Africa (10 percent).



5 Agricultural Services

AGRICULTURAL SERVICES include credit and marketing—both marketing of agricultural inputs (such as seeds, equipment, pesticides, and fertilizer) and marketing and storage of agricultural commodities (such as rice, sorghum, and livestock).[9]

Farmers typically need agricultural credit to permit them to adopt new technologies. New technologies, in contrast to traditional technologies, normally require farmers to make a cash outlay to purchase inputs such as new seed varieties, chemical fertilizers, and pesticides, or to purchase the means of motorized or animal-powered cultivation. Unless farmers have their own savings available, they need to borrow.

Agricultural marketing services are needed to transport, store, package, and process inputs all the way from manufacturer to farm. Marketing services are needed as well to perform the same functions in reverse for agricultural outputs—from farm to final consumer. Unless these services are available, farmers will be unable to adopt new technologies. Even when the services are available, costs may be too high, and farmers will be unwilling to adopt new technologies.

Marketing costs can be reduced by investing in infrastructure to reduce transportation costs or in information services (that broadcast commodity prices, for example) to improve farmer decision-making. Marketing costs vary substantially by commodity and by country. They are, however, typically higher in African countries than in Asian countries, because of higher transport costs related to poorer infrastructure and larger country size (Ahmed and Rustagi 1987).

Many developing-country governments have viewed market failure and high marketing costs as justification for intervention in agricultural credit markets as well as input and output markets. Governments nationalized many of the marketing functions, often by creating parastatals (government-run enterprises) with monopoly control of a particular commodity and by passing laws to control prices and marketing margins (thus setting the stage two or three decades later for needed reforms discussed at the beginning of section 2).

This began to change in the early 1980s. In agricultural credit, these changes have been manifested by fewer subsidized credit projects, less targeting of loans, more flexible in-

[9] This section is based on a synthesis prepared by Richard L. Meyer and Donald W. Larson, *Issues in Providing Agricultural Services in Developing Countries,* December 1993.

terest rates, and more emphasis on savings mobilization. Moreover, emphasis has shifted from measuring the impact of credit activities on borrowers to measuring the viability of financial institutions and the performance of financial markets.

As for input and output markets, many parastatals have failed to perform efficiently and are now in various stages of bankruptcy, closure, or privatization. The private sector is now seen as appropriately having the dominant role in distributing inputs and outputs in the context of competitive markets, with the role of the state being to create an enabling environment in which the private sector has financial incentives to operate.

USAID and World Bank Funding of Agricultural Services

Agricultural Credit

USAID has a long history of supporting agricultural credit. Between 1950 and 1973 (when the *Spring Review of Small Farmer Credit* was published), the Agency channeled more than $700 million into agricultural credit (Donald 1976). From 1973 through 1985, USAID allocated an additional $300 million to agricultural credit, for a total of slightly over $1 billion (Chew 1987). The lion's share of credit funds went to the Latin American region.

The World Bank has been the largest external source of funds for agricultural credit projects. All together, 94 countries received Bank funding for agricultural credit from FY 1948 through FY 1992 (World Bank 1993b). The Bank funded 683 credit projects totaling $16.5 billion (current dollars) and representing 26 percent of the Bank's total agricultural lending during the period. Forty percent of the funds were concentrated in three countries (India, Mexico, and Brazil). More than 80 percent of the funds were allocated to projects in which credit was the chief component; the remainder went to projects with credit as one of several components.

Agricultural credit also has been important in lending programs of the regional development banks. During 1970–82 the Inter-American Development Bank provided more than 60 loans for agricultural credit totaling more than $1.2 billion. Additional projects included credit as a component (IDB 1984). The IDB pipeline for 1983–86 included 13 loans for agricultural credit totaling $640 million plus additional loans with credit components. The Asian Development Bank began its agricultural credit operations in 1970. By 1991 it had approved 72 projects for a total of almost $1.4 billion. Just over $1 billion was provided by 36 projects where credit was the sole component; the remainder was provided by projects in which credit was one of several components (ADB 1993).

Thus, donors have funded a combination of "credit only" projects and "credit component" projects. The credit component type was particularly important in the mid-1950s when projects were designed to stimulate farm production through adoption of a package of agricultural inputs, and credit was perceived as part of the package. With the advent of the green revolution in the mid-1960s, many projects specified a package of inputs, and farmers were able to obtain credit only if they used that recommended package. Later, when new inputs were readily available and lending institutions were in place, credit-only projects were designed to stimulate lending to specific clientele groups, such as small farmers.

In both types of projects, the rationale for donor and government involvement was often based on the assumption that lack of access to credit kept farmers from adopting modern technologies. Such adoption required poor small farmers with meager savings to lay out cash for inputs such as fertilizer and improved seeds. This perception of unmet need for credit led policymakers and donors to increase the supply of loans, which was considered necessary to spearhead agricultural development (Lieberson et al. 1985).

Agricultural Marketing

From 1980 through 1986, the major bilateral and multilateral donors invested $12.5 billion in agricultural development, of which 8 percent was allocated to agricultural marketing services (Meissner 1989).

Of 203 agricultural services projects funded by USAID during 1958–82, 24 (12 percent) were "marketing only" projects; many others, though, had a marketing component (Solem et al. 1985). Of the 203 projects, 72 were implemented in Africa, 40 in Asia, 70 in Latin America, and 21 in the Near East. USAID marketing assistance has been oriented mainly toward the public sector (52 percent); the remainder has been provided solely to the private sector (22 percent) or to both the public and private sectors (26 percent).

Of 402 agriculture projects supported by the World Bank from 1974 through 1985, only 12 (3 percent) had a "marketing only" objective; however, an additional 185 projects (46 percent) included marketing components (World Bank 1990a). Of the 185 agriculture projects that included marketing assistance, 110 were implemented in Africa; 35 in Asia; 10 in Europe, the Middle East, and North Africa; and 30 in Latin America and the Caribbean. Most World Bank marketing assistance has been provided to parastatals, with small amounts to private sector firms and cooperatives (World Bank 1990a).

The Impact of Investments in Agricultural Services

Agricultural Credit

Serious doubts about the impact of agricultural credit projects began to emerge as early as 1973 with the USAID *Spring Review of Small Farmer Credit* (Donald 1976), and many evaluations and academic studies since then have documented their shortcomings. These evaluations have, however, faced serious methodological problems. First, because credit is fungible, it is difficult to measure its results. Second, credit projects can affect (positively or negatively) 1) borrowers (the farmers), 2) lenders (cooperatives, commercial banks, development banks), and 3) the national economy. But the evaluations usually ignored the effect of credit projects on lenders, an omission that often resulted in the paradox of successful credit projects but failing financial markets (Adams 1988).

Farm-level impact. The fungibility of credit makes it extremely difficult to determine farm-level impact. Some borrowers, for example, divert farm credit to finance more lucrative nonfarm activities, especially when the loan is subsidized. Others use loan funds to substitute for their own savings, which in the absence of credit they would have used to purchase agricultural inputs. Thus it is difficult to attribute changes in agricultural output or farm income to agricultural credit: it may increase in the absence of credit; it may decrease even with credit. The following examples illustrate the point.

1. The World Bank reviewed the farm-level impact of 41 credit projects completed over five years. The review was generally favorable. It found, for example, that World Bank credit helped spur rapid expansion of farm mechanization in central and southern Brazil in the 1970s and 1980s. The review also noted, though, that during 1978–85, the rapid expansion of rural lending was not matched by a commensurate increase in farm *production*. That was mainly because the funds, which were not indexed for inflation, were diverted to nonfarm uses. When the interest rate was raised to reflect inflation more accurately, the credit program again served farmers who invested in farm enterprises (World Bank 1993b).

2. The large Masagana 99 program in the Philippines, supported by USAID beginning in 1973, involved a package of inputs and supervised (and subsidized) credit provided without collateral. The lending program reached as many as 530,000 farmers at one time, and

roughly a third of all rice farmers in the country. By the early 1980s, however, the number affected fell to 70,000 owing to accumulated defaults.

3. India has received substantial donor assistance for agricultural credit. About 30 percent of rural families have obtained access to institutional credit under a system that includes targets, quotas, interest rate controls, and huge subsidies (Reserve Bank of India 1989). A 1989 study found that although the rapid *expansion of banks* had a large influence on fertilizer demand and on investments in tractors, pumps, and animals, the *interest rate subsidy* had little influence on fertilizer demand or aggregate crop output (Binswanger, Khandker, and Rosenzweig 1989).

4. If expansion of credit had a large effect on production, one might expect production to fall after credit supplies or interest rate subsidies are reduced or eliminated. But it has been difficult to identify any short-term production declines due to credit shrinkage. This suggests farmers have been able to find ways other than through subsidized formal credit to finance their operations when credit programs were terminated (Vogel and Larson 1984; Araujo, Shirota, and Meyer 1990).

5. Use of subsidized credit has sometimes led to misallocation of resources. A subsidized credit project in Yugoslavia, for example, encouraged overinvestment in agroindustry, resulting in substantial excess capacity. Subsidized loans in Morocco and Tunisia may have led small farmers to acquire oversized tractors. By contrast, a moderately subsidized credit project in Pakistan did not accelerate the use of tractors beyond their economic return, nor did it encourage excessive displacement of agricultural labor (World Bank 1993b).

6. Subsidized credit projects have tended to worsen, rather than improve, income distribution. In Costa Rica, for example, 80 percent of all agricultural loans made in 1974 went to large farmers, among the wealthiest persons in the country. It was they, not poor farmers, who benefited most from the interest rate subsidy (Vogel 1984). The same situation occurred in Brazil from 1970 to 1985, where most of the interest rate subsidy went to the wealthiest farmers, thereby worsening the country's already unequal income distribution (Araujo, Shirota, and Meyer 1990).

Effect on financial institutions. If the effect of credit projects on farmers is ambiguous, their effect on lending institutions is clear. Many public development finance institutions, including specialized agricultural development banks, have failed in developing countries; others have had to be recapitalized because of losses; and most rely on continuous subsidies (McKean 1990). Of the financial institutions supported by World Bank agriculture projects, only 44 percent were financially sound by the end of the project (World Bank 1993b).

Four reasons account for the poor performance of agricultural financial institutions: 1) poor loan recovery, 2) high operating costs, 3) neglect of deposit mobilization, and 4) a hostile economic environment.

The first factor, poor loan recovery, can be devastating for financial institutions. Agricultural borrowers are more prone than nonagricultural borrowers to suffer from natural calamities and thus to default on loan payments. Also, the incentive structures built into government- and donor-funded programs (as distinct from commercial operations) tend to have a negative influence on loan recovery. Thus, lenders tend to be rewarded for making, not recovering, loans, and this leads to lax record keeping and weak collection efforts.

Similarly, subsidized interest rates lead to loan rationing, and that provides an environment conducive to political intrusion about who gets cheap loans and who must repay. Thus, despite rhetoric to the contrary, subsidized loans go disproportionately to the better-off. Finally, targeted loans establish screening criteria for borrowers, criteria that may cause lenders to loan to customers who do not meet their normal lending criteria.

Out of thirty-five completed World Bank projects, only fourteen reported collection rates of 90 percent or more; seven had rates of between 70 and 90 percent; five had rates of between 50 and 70 percent; and nine had rates below 50 percent. Moreover, thirteen reported declining collection trends, nineteen reported level trends, and only three reported improving trends (World Bank 1993b).

The second factor, high operating costs, also hampers the financial viability of lending institutions.

In Honduras, for example, lending costs for a government-owned bank using donor funds were nearly five times those of a privately owned bank using its own funds (Cuevas and Graham 1984). In Sudan, the Agricultural Bank could charge only 7 to 9 percent on loans when its administrative costs averaged 10 to 15 percent (Ahmed and Adams 1987).

The third factor is that deposit mobilization has been neglected. Borrowers are more likely to repay and lenders are more likely to exert more effort at recovery when the funds come from local savers rather than distant governments or donors. USAID has supported savings mobilization projects involving credit unions and development banks. These efforts have achieved positive results on loan recovery in the Dominican Republic, Honduras, and Peru (A.I.D. 1991).

Finally, some financial institutions have failed because of a hostile economic environment (Chew 1987; Lieberson 1985; Meyer, Graham, and Cuevas 1992). In some cases, the macroeconomic policy environment has been a disincentive to agricultural growth (Krueger, Schiff, and Valdes 1988). In others, the new technologies on which credit projects were predicated were neither so available nor so profitable as assumed. In short, agricultural credit is not a good bet in the absence of an economic policy framework conducive to agriculture and an agricultural technology that is profitable.

Impact on the national economy. Agricultural credit projects have been an easy mechanism by which to disburse foreign exchange to developing countries. It might be argued that the positive effects of the foreign exchange on the national economy outweigh the poor performance of the credit projects at the farm level and their negative effects on financial institutions. But most donors have abandoned credit projects—suggesting that, all told, the costs of these projects exceed their benefits.

Although the overall impacts on borrowers, lenders, and the national economy have been disappointing, there are a number of successful cases.

1. Von Pischke and Rouse (1983) identified five countries in which financial services were being provided fairly successfully to smallholders in Africa: Caisse National de Credit Agricole in Morocco, the Cooperative Savings Scheme in Kenya, credit unions in Cameroon, savings clubs in Zimbabwe, and group credit in Malawi.

2. The Grameen Bank in Bangladesh has made thousands of small loans to poor people, mostly women, under a system of group lending (Hossain 1988).

3. The Indonesia experience is equally successful, except that loans are made to individuals rather than to groups (Chavas and Gonzáles-Vega 1993).

Factors contributing to the more successful results in these countries include 1) generally favorable economic conditions, 2) flexible interest rates so savers can be rewarded and financial institutions can cover their costs, and 3) emphasis on simple, traditional rural institutions that operate on a scale consistent with the routine transactions of rural people. In contrast, the failures are dominated by top-down projects designed to provide subsidized credit to targeted borrowers who are assumed to be too poor to save, so that savings mobilization is ignored. Also, little attention is paid to the

negative impacts of the projects on financial institutions.

Recent studies show that macroeconomic, financial, and agricultural policies must be reformed before interventions in rural financial markets are likely to be successful (Besley 1992, Stiglitz 1992).

Agricultural Marketing

Until recently, donors worked primarily with public sector organizations to strengthen agricultural marketing services in developing countries. However, the performance of these organizations has been disappointing to users, the government, and donors (World Bank 1990a and 1991). They have been plagued with high costs, poor management, misuse of funds, poor service, and large operating deficits.

Grain storage projects in Bangladesh, Brazil, India, and elsewhere were justified in the early 1970s on the grounds they would significantly reduce postharvest losses (estimated at 17–21 percent). Bulk storage of grain in large facilities was thought to be the most economical way to reduce these losses. But recent research has found losses in traditional storage are much lower than previously thought (1.5–4.5 percent) and that bagged storage is more economical than storage in large facilities (World Bank 1990a, 4).

Using more realistic postharvest loss data, the World Bank has recalculated the economic rates of return to investments in major grain storage projects it supported from 1974 through 1987. In India, rather than 25 percent, as was estimated during project design, the economic rate of return is 8.5 percent, assuming a postharvest loss estimate of 5 percent, the highest that could be justified (World Bank 1990a, 41). Given the low recalculated economic rates of return, it is unlikely the World Bank would have considered these grain storage projects bankable.

Large donor investments in wholesale markets and rural markets were also justified on the basis of reducing both food losses and marketing margins. These projects typically financed construction of facilities that were owned and operated by the public sector. As with the grain storage facilities, economic rates of return were probably overestimated, because actual food losses were much less than originally thought, and, as with grain storage facilities, they would probably not be considered bankable today (World Bank 1990a).

The impact of investments designed to improve the efficiency of agricultural markets is intimately linked to agricultural price policy. Farmers will produce a marketable surplus if it is profitable to do so. Price level and price stability are key factors that help to determine whether markets will be profitable. As suggested at the beginning of section 2, governments have used undervalued foreign exchange rates, price ceilings, broad territorial pricing, marketing margin controls, parastatal marketing monopolies, and other policies to reduce food costs in urban areas. But at the same time, they have reduced producer price levels. The effect has been to reduce the farmer's incentive to produce a surplus that can be sold profitably on the market.

Price instability (as distinct from price level) is often caused by rainfall variability and other uncontrollable factors. It, too, can reduce the farmer's incentive to produce a marketable surplus. Parastatals have attempted to stabilize prices by buying food grains at floor prices and then storing the grain until prices rise. But the cost of these operations has usually been high, and most analysts believe price stability can be achieved more cost-effectively through private sector trade than by government operations to buy and store grain (Abbott 1985; Neils, Reed, and Lea 1992). In fact, reducing government intervention in markets is widely viewed as necessary to improve market performance (Krueger 1978, World Bank 1991).

Given this record of failure, many governments have tried to deregulate markets, promote competition, and privatize government parastatals. The key to market liberalization is to introduce policy and regulatory reforms that

effectively dismantle government control of agricultural prices (at different levels in the marketing chain) and reduce direct government participation in agricultural input and product markets. Recent USAID experience in supporting agricultural market liberalization in seven countries in Africa (the Gambia, Mali, Mozambique, Niger, Togo, Uganda, and Zambia) has been positive (Wolgin 1990). The biggest outcome of market liberalization is reduction in marketing costs. That reduction has increased incomes for producers and reduced prices for consumers.

Agricultural marketing has been most successful when the private sector has played a dominant, if not exclusive, role in commercial production, processing, and trading activities. The government, by contrast, has a legitimate role in providing facilities and services that are public goods, or give rise to externalities, or exhibit large economies of scale (Jaffee 1993, 57–60). USAID and other donors, for example, have helped to develop marketing software that provides price information for basic foods at the retail, wholesale, and farm levels on a regular basis. Such systems now operate in Brazil, Chad, Colombia, Costa Rica, Ecuador, Indonesia, Kenya, Korea, Mali, the Philippines, Taiwan, Thailand, and Tunisia.

As indicated at the outset, agricultural services include both the marketing of agricultural commodities and the marketing of agricultural inputs. A World Bank survey of 39 countries found a strong tendency for the government to control procurement and distribution of key agricultural inputs in the 1980s, as shown in table 10.

In Africa the main obstacles to efficient delivery of fertilizers were found to be lack of foreign exchange to import fertilizer, import licensing systems, price controls, fixed marketing margins, poor transport facilities, insufficient resources for parastatals to finance distribution, and lack of working capital (for importers, wholesalers, transporters, and retailers) (Lele, Christiansen, and Kadiresan 1989, 47). USAID has supported a number of market liberalization programs designed to reduce fertilizer subsidies and price controls, eliminate marketing margin controls, reduce government distribution of fertilizer, and increase private sector marketing of fertilizer and other inputs. Wolgin (1990, 37) found that in four countries in Africa (Cameroon, Guinea, Kenya, and Malawi) private marketing was much more efficient than public sector marketing and that efficiency gains from privatization can amount to 25 percent of the cost of inputs.

Bangladesh is another case where distribution of fertilizer and other agricultural inputs has been liberalized, with beneficial results. One benefit is that farmer access to fertilizer points of sale has greatly increased. Moreover, fertilizer prices under the new private marketing system are lower than under the old public

Table 10. Percentage of Input Marketing Services Controlled by the Public Sector, Private Sector, and Mixed for 39 Countries in the 1980s

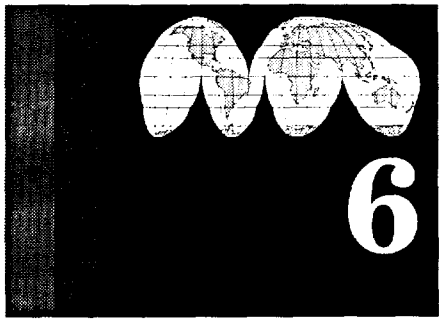
Input Marketing Service	Public Sector Alone	Private Sector Alone	Mixed (Public and Private Sectors)
Fertilizer	64	11	25
Seeds	61	11	28
Chemicals	47	17	36
Farm equipment	42	22	36

Source: World Bank, in Abbott 1993.

marketing system. Another benefit: the private sector's market share of total fertilizer sales increased to more than 84 percent in 1990–91 from 61 percent in 1989–90 and from nearly zero in 1978, when the program began with USAID assistance (World Bank, in Abbott 1993, 303; IFDC 1990 and 1991).

Thus, market liberalization and privatization can succeed. The private sector, which appears to have a comparative advantage in providing the vast majority of agricultural services, can carry out input and output marketing better and at lower cost than government parastatals (Wolgin 1990, World Bank 1990a). In contrast, governments need to invest in infrastructure (such as roads and bridges, as distinct from trucks and gasoline) and market software (such as price information) to improve the performance of the market system and make private markets work better.

The World Bank has summed up what may be the key conclusion about agricultural marketing activities: On the basis of all marketing projects reviewed, "the clearest lessons relate to actions that should be avoided rather than to those that should be replicated" (World Bank 1990a, 25).



6 Asset Distribution and Access

THIS ELEMENT of agricultural development concentrates on agrarian structure, the institutional framework that determines distribution of and access to resources. Land is the fundamental resource for agriculture. Investments to improve asset distribution and access can increase agricultural productivity and promote equity.[10]

In characterizing the various types of agrarian structure and alternative interventions to reform them, the literature distinguishes among several concepts:

Land tenure is the legal rights and institutions that determine how land is owned and operated.

Land reform is a basic restructuring of land tenure (Thiesenhusen 1989). Some analysts distinguish between land reform (redistribution of land or property rights) and *agrarian reform*, which (as used here) includes both land reform and provision of ancillary infrastructure and agricultural services. These elements of agricultural development, discussed in earlier sections of this report, usually must accompany land reform to ensure its success.

Tenure security is the assurance of continuing access to land or related resources. Land reform is one way to improve tenure security. Other ways include titling programs (issuance of legal documentation to holders of land) and land registration programs (recording those titles by the state) (Stanfield 1990). Other ways to enhance access to land or otherwise modify the existing distribution of land include programs to improve the functioning of land markets, land taxation systems, and land settlement programs.

Land reform, which breaks up large farms and redistributes the land as smaller farms, makes sense as a way to spur agricultural growth, because small farms in developing countries tend to be more productive than large farms. Empirical evidence supporting this inverse relationship has been examined most extensively by Berry and Cline (1979).

Table 11 shows this relationship for 37 countries grouped by region. Countries where average farm size is smaller and where distribution of land is more equal generally have higher farm output and higher employment per hectare of available land. That is, as farm size increases, farm output per hectare and employment per hectare decrease. This is because large farms use land less intensively than small farms, as measured by percent of farm area under cultivation. In addition, the small farms

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10 This section is based on the paper by Virginia Lambert with Mitchell A. Seligson, *Asset Distribution and Access: Land Tenure Programs*.

Table 11. Productivity, Employment, and Average Farm Size in Selected Countries

Country	Size of Average Holding (Hectares)	Farm Output per Hectare (US$)	Employment per Hectare
Mexico and Central America			
El Salvador	6.95	186	0.38
Guatemala	8.17	144	0.29
Dominican Republic	8.64	129	0.28
Nicaragua	37.34	55	0.09
Costa Rica	40.70	83	0.09
Mexico	123.90	22	0.04
South America			
Peru	20.37	50	0.10
Colombia	22.60	67	0.10
Brazil	79.25	14	0.05
Venezuela	81.24	31	0.03
Paraguay	108.70	11	0.02
Chile	118.50	18	0.03
Uruguay	208.80	14	0.01
Argentina	270.10	18	0.01
Asia			
Korea	0.85	1,085	2.88
Indonesia	1.05	323	2.17
Japan	1.18	1,720	1.45
Nepal	1.23	352	2.54
China	1.27	841	2.05
Viet Nam	1.33	355	2.79
Sri Lanka	1.61	376	1.12
Pakistan	2.35	240	0.96
Thailand	3.47	166	1.21
Philippines	3.59	250	1.25
Turkey	5.03	155	0.64
Iran	6.05	187	0.32
India	6.52	172	1.22
Africa			
Malagasy Republic	1.04	293	3.32
Egypt	1.59	681	1.89
Togo	2.62	189	1.05
Uganda	3.29	167	0.84
Senegal	3.62	209	1.20
Kenya	4.20	183	1.31
Mali	4.35	98	2.06
Morocco	4.62	144	0.49
Botswana	4.75	168	1.18
Tunisia	15.41	42	0.12

Source: World Bank, *Land Reform: Sector Policy Paper*, 1975, p. 26.

apply labor more intensively than do large farms.

This inverse relationship has generated extensive empirical research, both to refine the measures of agricultural production and agrarian structure and to verify the causal mechanisms (Sen 1981, Carter 1984, Carter and Jonakin 1987; Thiesenhusen and Malmed–Sanjak 1990, Binswanger et al. 1993). The relationship has been confirmed across a variety of agricultural systems and geographical locations. It holds as well when total social factor productivity (the sum of land, labor, and capital productivity as distinct from land productivity alone) is used as the measure of performance, at least above the very smallest size farms (Berry and Cline 1979, 134). It even holds when the influence of land quality is removed (Berry and Cline 1979, 126, 134).

There is sometimes a tendency (or desire) to try to reproduce in developing countries the economies of scale that characterize U.S. and other Western agriculture. But such attempts ignore differences in the relative abundance of factor inputs. In the United States, good agricultural land and capital are relatively abundant, but labor is not. Farmers can achieve economies of scale through application of labor-saving mechanical technologies to large land areas. In contrast, in most developing countries labor is relatively abundant, but good agricultural land and capital are not. Thus, profitable production technologies tend to use large amounts of labor (relative to capital) on small farms. Also, seeds and other biological technology are highly divisible (unlike mechanical technology—tractors and such). By using improved biological technology, small farms (like large ones) can achieve high per hectare yields and profitability.

A second important relationship also underlies interventions to improve land distribution and access. This is the presumed positive relationship between tenure security and agricultural productivity. The degree of tenure security varies along a continuum, from holding land as a squatter (little security) to holding fully titled and registered private property (maximum security).

In principle, a farmer with more secure tenure will work the land more intensively and make long-term capital improvements, because he knows he will be the beneficiary of the investments. What's more, fully registered titles allow the land to be used as collateral for credit. That contributes to increased investment and thus increased productivity. (As indicated below, however, empirical evidence on the relationship between titled land and access to credit is mixed.)

Market mechanisms, as distinct from redistributive land reform, can also improve land distribution and increase productivity. The main problem with this alternative is that land markets are imperfect, especially in developing countries. In Latin America, for example, small and large properties are transferred in separate markets. That thwarts a major potential objective of land markets—to eliminate farms that are too large and too small. Also, land markets are often distorted and tend to operate to the benefit of large farmers. When transaction costs are fixed, for example, the cost per unit of land is greater for smaller farms than for larger farms.

Where land markets do operate efficiently, land taxation can influence land distribution and, in turn, agricultural production. At a minimum, a standard tax on all land, productive or not, should encourage owners of large, unproductive farms to sell or to become more productive. In reality, though, most taxation systems are manipulated by the rich and powerful for their own benefit.

Finally, land settlement is an option, not for modifying the distribution of land currently in production, but rather for bringing new lands into production. Of course, opening new land to farming is an option only in countries that have significant tracts of uncultivated land. In addition, settlement of new lands typically requires infrastructure investments that generally are expensive.

Historical Context

From the end of World War II through the early 1960s, the United States promoted land reform in other countries. It was particularly effective in guiding and financing reforms in Japan, Korea, and Taiwan. In all three countries, success is largely attributed to the fact that reform did not involve redistribution of land but rather a change in tenure status: small farmers continued to farm the same land, but as owners rather than as tenants.

The importance the United States attached to land reform is seen in the 1961 Charter of Punta del Este for the Alliance for Progress. It proposed land and tax reform as conditions for U.S. financial aid to Latin American countries. The pre-1960 reforms, including those directed by the United States in Asia, generally are viewed as the most successful. In Latin America the major pre-1960 reforms took place in Mexico (1930s), Bolivia (1952), and Cuba (1959). These were generally driven by indigenous populist forces and revolutions.

In the 1970s, U.S. support for land redistribution was seen as a tool to forestall the rise of communist peasant organizations. Thus, cold war concerns led to U.S. support of land reforms in El Salvador and Viet Nam but not in Salvador Allende's Chile or Sandinista Nicaragua. During 1978–83, $2.8 billion was budgeted by the United States for land reform programs. Of 52 countries surveyed by USAID in 1980, more than half had current activities dealing with inequitable access to land. Another third had such activities in the works (Montgomery 1984).

In the 1980s, opponents of reform were bolstered by the lack of results of ongoing reforms in Latin America and elsewhere, and their high cost. Evaluations showed that successful land redistribution required costly additional investments in ancillary services and rural infrastructure to support reform beneficiaries. At the same time, U.S. foreign assistance was shifting toward macroeconomic policy reform and private enterprise development. This shift was reflected in both USAID and World Bank policy concerning land reform. Before the shift, the 1970 *Spring Review of Land Reform* (A.I.D. 1970) had concluded that land redistribution should be supported because of its social and political effects on the distribution of opportunity, power, and employment. This conclusion was reinforced by the Agency's 1979 Policy Determination on "Land Reform." In 1986, however, the Agency's new Policy Determination on "Land Tenure" mentioned neither land reform nor redistribution.

Reflecting a similar evolution in policy, the World Bank's 1976 "sector policy paper on land reform" states: "In circumstances where increased productivity can effectively be achieved only subsequent to land reform, the Bank will not support projects which do not include land reform" (World Bank 1975, 14). However, more recent Bank discussion papers question the financial and political feasibility of carrying out reform and conclude that in most circumstances other policy options may have more impact than land redistribution (Binswanger et al. 1993).

In the 1990s, land tenure continues to be important, but from a different perspective. Concern about natural resource utilization and conservation has sparked a conflict between, on the one side, small farmers and landless people who need land to farm for food and, on the other, those who champion a need (less immediate than the farmers') for protected environmental zones. Also, disintegration of the former Soviet Union has moved land tenure issues of decollectivization and privatization to the forefront of the policy agenda in Eastern Europe and in the new independent states.

Impact of Investments in Asset Distribution and Access

The *Spring Review of Land Reform* (A.I.D. 1970) provided strong evidence for the hypothesis that prereform levels of production and productivity generally increased or at least

were maintained when farm size was reduced as a result of reform. This conclusion was based on 30 country case studies. They showed, for example, that in Yugoslavia in the 1920s, North Viet Nam in the 1950s, and Iran in the 1960s, output shot upward right after the reforms, because sharecropper arrangements were changed.

But this was not always the case. In Bolivia, for example, initial output dropped immediately after reform (because contested lands were not cultivated). The same happened in Cuba (because of the early drive for diversification) and in Algeria (where a socialized, but still highly productive, sector was reformed).

Warriner (1973, 120) compared changes in average wheat yields in six countries. Three of the countries (Egypt, Italy, and Japan) implemented integral land reforms (that is, land reform together with rural infrastructure and agricultural services). The other three countries (Bolivia, Iran, and Iraq) implemented simple land reforms (land reform without corresponding changes in infrastructure or services). Comparing changes in average wheat yields, Warriner concluded that integral land reform was more successful than simple land reform. Integral land reforms implemented in Japan, Korea, and Taiwan, generally regarded as successful, reinforce this conclusion.[11]

The World Bank assessed the results of land reforms in five Latin American countries: Bolivia (1952–55), Chile (1967–73), Mexico (1934–40), Peru (1969–76), and Venezuela (1965–70) (Eckstein et al. 1978). The evaluators found unequivocal positive outcomes in production in four of the five cases (Peru was the exception). Although it was impossible to separate out the direct effect on production, reform was clearly associated with the accelerated growth rates in the four countries, even if it did not cause the growth (p. 112). The evaluators also found that

- The inverse relationship between farm size and productivity held in all five countries, particularly in Mexico and Bolivia. The evaluators attributed this to greater labor intensity on small farms and changes toward higher value farm products.

- In all five countries low-income beneficiaries gained and high income landlords lost. These outcomes were greatest in Mexico and Bolivia, minimal in Chile and Peru.

During the last decade, several retrospective comparative studies of the effects of land reform in various countries have been published. In contrast to the earlier studies cited above, these studies suggest that anticipated positive economic effects have not been realized. The studies provide no quantitative data on the economic effects of land reform, but they do offer credible reasons for the poor performance:

1. Thiesenhusen (1989) examined land reform in 10 countries and suggests that the multiple goals of the reforms (social, political, and economic) were not compatible. He points out, moreover, that many beneficiaries of land reform had inadequate access to agricultural services and inputs needed to farm effectively.

2. Dorner (1992) attributes the failures of land reform to the lack of strong commitment and insufficient political will. Like Thiesenhusen, he notes that agricultural services (inputs, credit, markets) were not available through the private sector and were not provided by the government.

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[11] However, the successful land reforms implemented in East Asia after World War II also created institutional barriers that, almost 50 years later, tend to discourage land sales, leasing, or consolidation. As a result, many farms are only a fraction of their most efficient size in today's global economy (Tweeten 1994).

3. Powelson and Stock (1987) reviewed land reform programs in 27 countries and found that government was responsible for disappointing results. They concluded that the state used land reform as a tool to skim off agricultural surplus rather than to allow peasants to realize the benefits of land ownership.

4. In contrast, de Janvry (1981) believes land reform *did* have a positive effect on agricultural production, but that increased production was due to reform-induced changes on lands excluded from the reform. Farmers on excluded lands feared they would be adversely affected in the future; therefore, they began farming more efficiently. As a result, production increased on *those* farms rather than on farms created by the reform.

Evidence concerning the impact of land-titling and land-registration programs is mixed:

- In Thailand, a comparison of titled and untitled landholders showed increased access to and use of credit, and increased investment, among titled landholders (Feder et al. 1988).

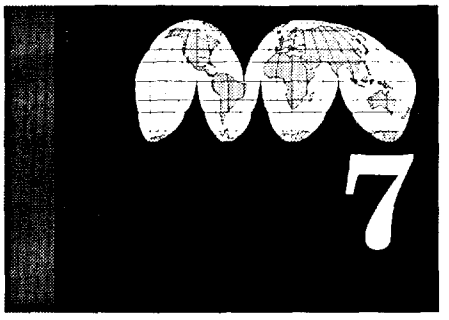
- In contrast, a comparative evaluation of USAID-sponsored land titling programs in Ecuador, Honduras, and St. Lucia showed no systematic differences in use of credit between titled groups and control groups. The study did show, however, that small farmers perceived an increase in the value of titled land compared with untitled land as a result of the titling programs (Stanfield 1990).

- In Kenya, Uganda, and Zimbabwe, titling in and of itself had little effect on investment demand or credit use because of constraints on the supply of credit (Barrows and Roth 1989).

Land-financing programs designed to influence land markets have been supported in Latin America. These have included the Penny Foundation land purchase/sale program in Guatemala, a mortgage guarantee fund in Honduras, and a land bank program in St. Lucia. Although no evaluations address the effect of these programs on agricultural production, any effect has probably been negligible. The Guatemala program has run into organizational problems; the Honduras program, which was intended to make land loans, was used very little before it expired; and the St. Lucia program was never fully implemented. A central issue for both governments and private organizations in implementing land financing programs of this nature is whether the political will exists to foreclose on small, otherwise landless, farmers in the event of nonrepayment of land loans.

Land taxation is generally an ineffective way to achieve nonrevenue goals such as intensifying land use or encouraging land sales (Strasma 1987). Developing countries typically lack the institutional infrastructure needed to assess, collect, and process the taxes. Moreover, land taxes are usually very low (often because of political pressures) and therefore do not constitute effective incentives either for current owners to use their land more intensively or to sell their land to those who might do so. And because land taxes are low, the expense of collection is generally not justified. Finally, tax collection is frequently plagued with corruption. Thus, land taxation schemes face many of the same political hurdles as redistributive land reforms (Binswanger et al. 1993).

Land settlement projects have also received donor support. A World Bank review of 27 settlement projects reported that 62 percent of those that had been audited had economic rates of return of 10 percent of better. But the costs per family were high. They usually exceeded $10,000 per family for irrigated settlement projects and ranged from $5,000 to $20,000 per family for rain-fed agriculture (World Bank 1985).



7 Findings

SECTIONS 2–6 synthesized the evaluation literature in each of the five major areas of agriculture. This chapter summarizes the findings of the desk study in light of the six key questions identified at the outset. As will become apparent, the evaluation literature was more helpful in answering the first three questions (about the relative importance of alternative investments in agriculture) than it was in answering the last three questions (about the most appropriate entities to undertake investments, or implement projects, in the five subsectors of agriculture). The findings:

1. *There is a preferred sequencing of investments in agriculture.* The evaluation literature is clear on this. The first priority is to develop an environment in which agriculture will function. Such an environment includes at least three components: policies, technology, and infrastructure.

The overriding priority is policies that affect agriculture, whether directly or indirectly. Price policies, trade policies, fiscal policies, monetary policies, and exchange rate policies—all must provide farmers with an opportunity to make a profit. If a threshold level of appropriate policies is not in place, it is not worthwhile for donors to contribute to any other investments; nor is it worthwhile for farmers to take risks and use new technologies needed to increase production beyond subsistence levels.

Technology and infrastructure work synergistically if the proper policy environment is in place. There is no optimal sequence for investing in one or the other; rather, investments in both interact to promote each other. To promote agricultural growth, high-yielding agricultural technology must be available. Because traditional technology offers little scope for substantial productivity gains, farmers are unlikely to increase their use of production inputs or to dramatically change the way they allocate their resources.

At the same time, agriculture cannot perform well unless some rudimentary infrastructure is in place. The International Food Policy Research Institute synthesis suggests that "the degree of infrastructural development is in reality the critical factor determining the success of market-oriented sectoral and macroeconomic policies in the developing world" (Ahmed and Donovan 1992, 31). There is little value in supplying credit or modern inputs to farmers if they lack the roads, bridges, and transportation needed to acquire inputs and transport harvests to market. Subsidized credit or inputs cannot compensate for nonexistent roads or bridges.

Many projects designed to provide agricultural services (typically agricultural credit or marketing services) have failed. The main reason is that the services were provided in countries that were pursuing policies heavily biased against agriculture. Early supervised credit projects ran into difficulty because of an inadequate supply of good technology available for farmers to adopt (Donald 1976). Strong sup-

port institutions supplying agricultural services rarely exist where agriculture is unproductive and stagnant.

Finally, the evaluation literature suggests that there is no particular stage of development when investments to improve the distribution of assets or to improve access to land should occur. The literature does, however, make two generalizations. First, if investments to improve land distribution take place, they are typically designed to achieve a political objective, not an economic efficiency objective. Second, although political stability and equity (rather than economic considerations) drive the decision to improve distribution of assets, an economic impact, positive or negative, intended or unintended, will still result from such investments. The impact is likely to be more positive if ancillary services to support the investment are already in place—basic infrastructure, for example. Thus, investments to improve asset distribution should support agricultural development, not initiate the process.

Policy reform and planning. Getting the *macroeconomic* policy environment right is an important first step for getting the *agricultural* policy environment right. That in turn is an important first step for successful agricultural investments. Without policy reform, both macroeconomic and sectoral, many other investments fail.

Knudsen and Nash (1991, 131, 148) examined whether sectoral adjustment lending can proceed before macroeconomic stabilization has been achieved. They found progress on agricultural policy reform in an unstable macroeconomic situation to be rare. In fact, they found that projects implemented in a distorted, antiagriculture policy environment actually *discouraged* agricultural growth. They note that providing foreign exchange actually perpetuated overvaluation and indirectly sanctioned the continuation of the antiagricultural policies.

Similarly, Cleaver (1993) observed that in the late 1970s and early 1980s, 63 percent of the World Bank's agricultural projects were judged successful in countries with relatively "good" economic and agricultural policies (World Bank 1993a). In contrast, only 30 percent of the World Bank's agricultural projects were judged successful in African countries having relatively "bad" economic and agricultural policy. Getting the policy environment right is important for all sectors, but it is especially important for agriculture, given the history of economic distortions in the agriculture sector in most developing countries.

Agricultural technology development and diffusion. Although high-yielding technology must be available to farmers, the evaluation literature is unclear on whether investment in agricultural research is required at all stages of development. Some suggest, for example, that countries should first apply existing technology that is on the shelf, before developing new technology. Others suggest that very poor countries should borrow technology from neighboring countries, rather than develop their own.

Observers agree, however, that agricultural research designed to maintain existing yields (as distinct from achieving higher yields) is needed at all stages of development. There is also a consensus that complementary investments designed, for example, to establish market-oriented macroeconomic and sectoral policies and develop rural infrastructure can enhance the effect of investments in agricultural research.

Rural infrastructure. To the extent purchased inputs (such as fertilizer) are needed to boost agricultural productivity, and to the extent roads are needed to distribute those inputs, the absence of roads will constitute a binding constraint to increased agricultural growth. Similarly, to the extent increased agricultural output requires processing, and rural electrification is needed to operate higher volume agribusinesses (such as rice mills), the absence of electrification will impede agricultural growth. Rural electrification is also needed for electrically operated irrigation pumps, and ir-

rigation contributes directly to increased agricultural productivity.

2. *It is inconclusive whether investments in all five subsectors are essential.* Little in the literature directly addresses that proposition. What does emerge from the literature is that a country's predisposition to agricultural development is an important condition for success—whether or not this predisposition is linked to donor investments. In particular, some level of economic and social stability is essential for agricultural progress. This is not to suggest that the macroeconomic environment must be *highly* supportive. For example, a number of countries such as China and Brazil, show that agriculture can make considerable progress without optimal support. However, an egregiously unfavorable macroeconomic climate found in countries such as North Korea or Cuba prevents agriculture from succeeding.

Policy reform and planning. The most successful policy reform activities were those that supported an ongoing program of policy change, as distinct from those that tried to introduce new policies. The literature shows that attempts to introduce major new policy directions through nonproject assistance (such as cash transfers) often produced disappointing results (Wolgin 1990, ii). Similarly, successful projects occurred most frequently in those countries where reforms were already under way and were strongly supported by the countries' leadership.

Investments in analytical capacity building were most effective when five conditions were present: 1) There was active host country support. 2) Advisers had access to senior government officials. 3) Appropriate counterparts were assigned to the advisers. 4) Incentives existed for highly trained staff to remain with the analysis units. 5) Funding and supplies were adequate. (Tilney and Block 1988b, 12; Abt Associates et al. 1989, 31.) However, countries that resisted reform had little use for even the most cogent and forceful of analyses.

Agricultural technology development and diffusion. Except for certain isolated instances (such as Botswana and Singapore), few countries have achieved sustained economic growth without transforming agriculture; and the agricultural transformation has generally rested squarely on intensification of land use and technical change (Staatz 1992). It is true that countries with a large land frontier have been able to increase agricultural output through acreage expansion. But once the frontier is exhausted, easy gains in output must be replaced by increasing yields on existing land. This requires improved biological and mechanical technology.

Agricultural extension can have a positive effect on adoption of new crop varieties, but there is no evidence that extension is a necessary component of successful technology development and diffusion. In the Philippines, for example, farmers throughout the country use a rice variety developed, but never formally distributed, by the International Rice Research Institute. Farmers found a way to adopt this variety without the extension system, demonstrating that technologies that offer significant increases in economic returns will spread quickly. Other countries, such as Jordan, rely heavily on domestic private-input supply firms to obtain and diffuse timely technology from around the world (Tweeten 1994).

The highest priority for investing in education in developing countries is at the elementary and, to a lesser extent, secondary levels. Higher education, including higher agricultural education, is less important. There is often a presumption that an indigenous capacity to train agricultural scientists is necessary for agricultural development (Johnston et al. 1987, 127). However, no evidence indicates that this is a necessary condition for *technology development*, because scientific expertise can be obtained, at least in the short term, from developed countries. Although universities have been at the forefront of major production gains by developing seed varieties, their overall effect on technology development is mixed (Hansen 1989). Also, most universities have

not been involved in extension, mainly because government line agencies have guarded this function for themselves.

Rural infrastructure. The IFPRI synthesis suggests agricultural growth will probably not occur in the absence of investments in rural infrastructure. But to the extent growth does occur without such investments, it is likely to occur far less rapidly, judging from the comparison of infrastructure development in Africa and Asia.

Agricultural services. No country is likely to achieve a *high* level of agricultural development without investment in agricultural services. The greater the level of agricultural development, the greater the variety and sophistication of the services demanded. The private sector is generally the most efficient vehicle for providing these services.

Land tenure. Likewise, agricultural growth can occur in the context of insecure and inequitable access to land, but broad-based agricultural development is less likely without agrarian reform.

3. *Investments have been most successful when they remove a bottleneck or when existing conditions have favored progressive change.* For example, agricultural research is more likely to have a high payoff in countries where inadequate infrastructure has been replaced and modernized. Similarly, infrastructure investments are more likely to reap rewards in the presence of supportive economic policies and the availability of improved agricultural technology. Economic analyses have not been helpful in guiding decisions on resource allocation among sectors of an economy (or among the five subsectors of agriculture).

Policy reform and planning. The evaluation literature tends to look at success in terms of meeting program and project objectives rather than by calculating economic rates of return. Even the World Bank, which as a rule estimates rates of return for its projects, notes these measures are not applicable to policy reform and planning operations (World Bank 1993a, 75).

Donor investments in agricultural policy reform have had mixed results. Some activities have been quite successful, whereas others only partially achieved their objectives or had negligible results. One study of 80 World Bank adjustment operations found that 68 percent of those dealing with agricultural price policies successfully fulfilled conditionalities (Knudsen and Nash 1991). Another study found that 60 percent of the policy changes contained in World Bank conditionalities were fully implemented (McCleary 1991). USAID activities supported by nonproject assistance also resulted in a range of full and partial implementation of conditions, covenants, and self-help measures that were attached to the programs. As reported in various evaluations, between one half and three quarters of the activities were successful.

According to one review, 58 of 61 USAID policy analysis projects (95 percent) succeeded significantly in creating and staffing policy and planning units. However, only 58 percent succeeded to some degree in attaining institution-building objectives. Only 39 percent had a clear influence on decision-makers, such as increasing their demand for analysis or improving their understanding of the agricultural sector and its relationships with other sectors of the economy. Even fewer, 33 percent, achieved concrete changes in policy as a result of planning and analysis activities (Tilney and Block 1988b).

Agricultural technology development and diffusion. One lesson from the rate-of-return literature overwhelms all others: investments in agricultural technology development and diffusion have typically generated high rates of return. The social benefits from the investments justify the costs in a wide variety of countries, for a wide variety of commodities, and under a wide variety of conditions. However, agricultural research can contribute to increased productivity only if farmers adopt the new technologies. This requires a permissive, if not supportive, economic policy envi-

ronment, one that provides an opportunity for farmers to make a profit.

Rural infrastructure. Resources tend to be allocated to infrastructure development only when pressure for services is felt within the political system. When this occurs, decisions on how much to allocate to infrastructure relative to other activities are typically a matter of judgment, according to Ahmed and Donovan (1992), "bordering on the act of shooting in the dark." The cost of infrastructure development varies greatly across regions. However, cost estimates for road construction and maintenance per kilometer are less for Africa than for Asia and Latin America, partly because of less difficult terrain. This is true for both labor-intensive construction and capital-intensive construction in the three regions. But if the cost of road construction were calculated per unit of agricultural production (per ton of maize, for example, rather than per kilometer), it would presumably be higher in Africa than in the other regions. That is because agricultural production is comparatively low in Africa.

Agricultural services. Very few studies measure the economic rate of return to investments in agricultural services. That is partly because of the difficulty of measuring the return to investments that, by their nature, do not directly increase agricultural output (for example, broadcasting commodity prices). The chief contribution of agricultural services is to facilitate effective use of directly productive inputs, such as improved seeds, fertilizers, chemicals, and machinery. According to Jaffee (1993), conditions necessary to achieve a high rate of return to investments in agricultural services include favorable natural resources, appropriate macroeconomic policies, well-developed physical infrastructure, capacity to develop or adapt technology, human capital, prior or parallel development of complementary industries, and a dominant role of the private sector in providing services. Absent these conditions, investments in agricultural services are unlikely to be effective.

Asset distribution and access. Here again, benefit–cost analyses have not been undertaken for investments to achieve a more equitable distribution of, and secure access to, land and other agricultural assets. The literature does, however, identify at least two costs of *not* investing in this area. First are economic costs associated with maintaining an agrarian structure characterized by inefficiency, low profitability, and few incentives to invest in physical and human capital in the agriculture sector. Second are social costs resulting from protracted and violent uprisings and civil war.

Despite the costs of noninvestment, governments typically do not seriously invest in more equitable land distribution. The reasons are twofold. For one thing, the cost of land reform is so high as to make it infeasible in many cases. Small farmers often cannot pay for the land they receive, and elites resist paying for the reform either through taxes or through receipt of devalued bonds as compensation for expropriated land. Other mechanisms to improve tenure security and access to land (such as titling, land registration, land markets, and land taxation) have also been difficult to implement. The second, more important, reason is governments lack the political support to carry out change. Their constituencies are often deeply divided on issues of land reform and asset redistribution.

4. *Government should become involved in a particular investment only if it raises real national income more than would be the case if the public sector were not involved.* Another useful rule of thumb is that the public sector should become involved only when such involvement improves the performance of the private sector rather than displaces it.

Thus, it is logical for the public sector to invest in such areas as development of agricultural technology and rural infrastructure. These investments normally have the characteristics of public goods, whereby it is difficult for a private firm to recover investment costs. The private sector will not provide them unless paid by the public sector to do so, which may be more efficient in some cases. However,

some kinds of agricultural research (for example, on the development of hybrid seeds) can and should be carried out by the private sector because there are profits to be earned.

In like manner, it is logical the public sector has received most donor assistance designed to support policy reform and planning as well as to improve asset distribution and access, because it is government's responsibility to take decisions in these areas. In contrast, the private sector can be expected to invest in agricultural services when it is profitable to do so.

Policy reform and planning. Nonproject assistance provided by virtually all donors to support policy reform and planning has been directed to central governments alone. Project aid also has gone primarily to support ministries of agriculture, with some support to ministries of finance or planning. In a sense, this is proper because policy and planning activities are conducted by the public sector. However, policy analysis need not be conducted only by policy analysis units in ministries. Private or autonomous institutions (consulting firms, research institutes, university departments) can also perform it. So can hybrid teams of analysts drawn from public and private institutions.

The evaluation literature consistently shows that policy analysis and capacity-building are most effective when demand-driven; that is, when they respond to current needs identified in a ministry or in the economy. Too often, these kinds of activities are supply-driven, and the services of host country government staff and project advisers are utilized casually and inefficiently in the manner of free goods.

Agricultural technology development and diffusion. Governments need to invest in public goods, which include most agricultural research, since it is difficult for a private firm to provide these services and recover its costs by charging users for the benefits they receive. Indeed, the rationale for public sector involvement in agricultural research is that incentives for private sector involvement are not adequate to induce an optimum level of investment; that is, the social rate of return exceeds the private rate of return because a large share of gains from research are captured by other firms and consumers, rather than by the innovating firm (Ruttan 1982, 182).

Endowed foundations, which lie somewhere on the continuum between public and private research organizations, may be an alternative. As of 1988, seven agricultural research foundations in Latin America were either funded or proposed by USAID (Sarles 1988, 218). Three similar endowments for agricultural research have been proposed for Africa (Weatherly and Warnken 1994, 3).

Rural infrastructure. Most rural infrastructure, like most agricultural research, is a public good provided by the public sector (or by private entities subject to public control) in practically all countries. Because of the "free rider" problem, the private sector is unlikely to invest in rural infrastructure. However, the private sector can do the actual building and maintenance of roads or irrigation canals, with proper support from the public sector. Note, however, that the cost of *using* services (water and electricity, for example) made possible by rural infrastructure—as distinct from the infrastructure itself—should be paid by the users of those services (through user fees), not by the government or by donors.

Agricultural services. Generally, the private sector is best equipped to provide agricultural inputs and services as long as they can be sold for a profit. Farmers will pay the cost of inputs (fertilizer, hybrid seeds) and services (credit, marketing) if they find it profitable to do so. The weak performance of government banks and parastatal marketing boards suggests governments generally do a poor job of delivering agricultural services. The proper role of governments is to ensure an enabling environment conducive to provision of agricultural services by the private sector.

Asset distribution and access. The literature does not compare the relative merits of public sector and private sector institutions in dealing with land issues, nor does it compare market

mechanisms with nonmarket mechanisms in achieving more equitable distribution of and access to land. However, interventions designed to influence distribution of agricultural assets and change the agrarian structure are invariably undertaken by public sector institutions. Lack of political will on the part of most governments has been the principal factor limiting land reform and related interventions.

5. *For the most part, the evaluation literature is silent on the question of which agencies are best suited to implement which agricultural activities.* The discussion below is, therefore, largely impressionistic.

Policy reform and planning. Nonproject assistance to support policy reform has been implemented by donors working in conjunction with central governments. USAID has been instrumental in providing both the analytical underpinning for policy reform programs and in monitoring their implementation (Lieberson 1991, viii–ix). The World Bank has found a clear correlation between good performance of adjustment programs and adequate identification, preparation, and supervision of such programs (World Bank 1993a, xvii).

Some USAID capacity-building projects have been implemented by universities and nongovernmental organizations and private firms and under participating-agency service agreements with other U.S. Government agencies. These various implementing agencies have strengths and weaknesses.

University contractors are particularly well suited for implementing overseas analytical training for host country nationals because they offer a broad pool of in-house technical staff that can be involved with a project on a continuing basis. Yet university contractors often have the disadvantage of weak management structures, which may cause some concern because the literature on project implementation indicates good management is the most important factor in successful projects. In contrast, private firms were strongest in their ability to manage projects efficiently, though they may be less appropriate than universities for implementing long-term training programs. Management capabilities were also a weak point for participating-agency service agreements in the projects reviewed (Tilney and Block 1988c, 17).

Agricultural technology development and diffusion. Some have asserted that U.S. land-grant universities are well positioned to implement agricultural technology development and diffusion activities, but the literature provides no empirical evidence to substantiate or refute this assertion. That is, if evaluations have been carried out to test the assertion, they were not among those reviewed for this study.

Rural infrastructure. Conventional wisdom suggests that private contractors are best suited to implement infrastructure activities, but there is no empirical evidence to support this one way or the other. It may be appropriate for user organizations (managed, perhaps, by NGOs) to maintain rural infrastructure, especially rural roads and irrigation canals, but again, the evaluation literature reviewed for this study provided no substantiating evidence. However, the literature on local institutions (not reviewed for this study) does emphasize the importance of water user organizations, for example, in maintaining irrigation canals.

Agricultural services. Commercial banks have a better record of providing sustainable financial services than specialized agricultural development banks in most countries. In some cases, cooperatives and credit unions have also been successful. In contrast, the credit programs of most NGOs have been highly subsidized in the past, and their long-term viability without continuous subsidies has been questionable. Private firms also have a better track record than government agencies of providing efficient and timely agricultural inputs and marketing services. Some cooperatives have been successful in this area as well, but most that are government sponsored and government subsidized, have failed.

Asset distribution and access. Donor agencies may be well suited to advise governments on how best to go about setting up cadasters, titling and registration programs, and land taxation systems, but governments are best suited to implement programs designed to improve asset distribution and access.

6. *Similarly, the evaluation literature provides little insight into the comparative advantage of the United States in providing agricultural assistance in the five subsectors.*

Policy reform and planning. The literature suggests the United States has an advantage over other *bilateral* donors in providing assistance in the area of agricultural policy reform and planning. The advantage holds for both program and project activities. On the program side, resident Missions give USAID the ability to conduct and monitor operations more directly than other donors (Wolgin 1990, 24; Vondal 1989, 3–6; Weintraub, 1989, 26–31). The U.S. comparative advantage is also strong in training activities that draw on the resources of the American higher education system. In agriculture, this system is unmatched elsewhere in the world.

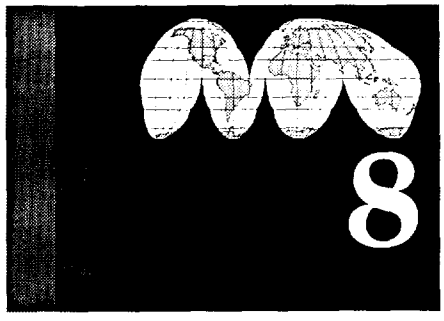
Agricultural technology development and diffusion. U.S. agriculture is among the most productive in the world, owing mainly to yield-increasing technology developed through agricultural research. Because of this, some have asserted that the United States enjoys a comparative advantage in providing assistance in this area. But this study turned up no empirical evidence to substantiate or refute the assertion.

Rural infrastructure. Development of rural infrastructure often requires a major capital investment. In view of this, donors with a large supply of resources, including the multilateral development banks, would seem to be in the best position to finance big-ticket capital projects.

Agricultural services. The United States has a large pool of analytical talent to study and advise on problems concerning delivery of financial and other agricultural services, but the private sector of the recipient country is ordinarily best equipped to deliver such services. This is particularly true if the overall policy environment provides a level playing field.

Asset distribution and access. Absent special historical circumstances (such as U.S. military occupation of Japan), international donors have very little influence over whether programs are introduced to alter the agrarian structure. Such programs are initiated for indigenous political purposes and require an internal political commitment (Montgomery 1984).

One lesson of the Alliance for Progress was that financial assistance and political pressure from the outside are not enough to persuade an unsupportive government to implement meaningful agrarian reform (Dorner 1992). Moreover, by law the United States cannot support land acquisition and transfer costs, unless such support is in the national interest. In any event, since the most obvious failures of land reform are those that have left new owners without ancillary services after the old support system was withdrawn (Montgomery 1984), donors should emphasize provision of those services.



8 Management Recommendations

WHAT DOES ALL THIS mean for USAID management? The evaluation literature provides clear answers to some, but not all, of the six questions raised at the outset. But even when the literature is unclear, it provides certain insights that can help the Agency better understand key issues in agricultural development:

First, the literature strongly suggests that a country's predisposition to agricultural development is an important condition of success—whether or not this predisposition is linked to donor investments. This means that *in countries where agriculture cannot be profitable because of an adverse economic policy environment, including both macroeconomic and agricultural policies, the Agency should invest reluctantly, if at all, in agricultural development.*

Second, bottlenecks to agricultural growth in developing countries are likely to be most binding in policy reform, technology development, and rural infrastructure. They are generally less of an impediment in agricultural services and asset distribution. Because there is a preferred sequencing of investments in agriculture, *USAID should concentrate its investments on priority areas to alleviate the binding constraints (not* all *the constraints) to agricultural growth.*

When USAID decides it makes sense to invest in agricultural development, the following recommendations merit consideration.

1. *Policy reform and planning.* Nonproject assistance can help governments of low-income developing countries create an economic policy environment designed to help agriculture markets work. Such investments are most successful when they are used to facilitate ongoing economic policy reforms. They are less successful when they are used to initiate new policy reforms or to "buy" reforms to which the government is not committed. Accordingly, *USAID should provide nonproject assistance to support economic policy reform only in countries where it will be used to facilitate reforms already initiated.*

2. *Technology development and diffusion.* If high economic rates of return were the only criterion USAID used in deciding how to invest in agriculture, development of new agricultural technology would probably top the list. An even more compelling reason to invest in the development of high-yielding or cost-reducing technologies is that most countries have not achieved sustained economic growth without transforming their agriculture. The agricultural transformation typically requires technical change—that is, improved biological and mechanical technology. *Therefore, USAID should invest in the development of new agricultural technologies.* It should emphasize adaptive, rather than basic, research. It should promote technology transfer from neighboring countries and from international agricultural research centers. The Agency should also sup-

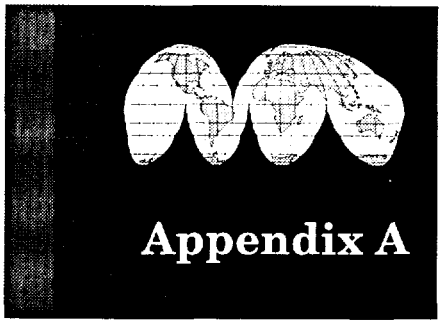
port agricultural research necessary simply to sustain existing yield levels.

3. *Rural infrastructure.* Donors are understandably reluctant to invest in rural infrastructure. Such investments are costly, and existing infrastructure is often not maintained by the public sector. However, it is unlikely that agricultural growth will occur in the absence of investments in rural infrastructure. *Therefore, donors should consider investing in new rural infrastructure and—if justified by economic analysis—in the maintenance of existing infrastructure as well.*

4. *Agricultural services.* The *private* sector is best equipped to provide agricultural inputs and services that can be sold for a profit. The *public* sector has an important role in helping markets work better (as distinct from displacing markets) through such activities as reforming policy and developing infrastructure. Although donors may be in a position to *advise* developing countries on how best to establish input distribution systems, strengthen financial services, support marketing and storage activities, and develop price information systems, *actual investments in agricultural services are best left to the private sector.*

5. *Asset distribution and access.* Programs designed to improve access to land and other agricultural assets are motivated by political objectives, not by agricultural development objectives. Donors may be in a position to *advise* governments on how best to implement titling schemes, cadastral surveys, land reforms, and other activities designed to improve access to agricultural assets. But *most investments in this area are best left to the indigenous public sector.*

The foregoing recommendations are reasonable, consistent with conventional wisdom, and in many cases, applicable across most countries. But one needs to recognize them for they are generalizations; there is no substitute for careful analysis. *USAID should analyze each country situation before investing in agricultural development.*



Appendix A

The Role of Agriculture in Economic Growth

ECONOMIC DEVELOPMENT is a process by which an economy is transformed from one that is dominantly rural and agricultural to one that is dominantly urban, industrial, and service oriented. As a result, economists studying economic growth have, with few exceptions, tended to neglect agriculture and concentrate instead on strategies for industrialization. The intellectual neglect of agriculture's role in development is rooted partly in an underlying view that agriculture is backward and partly in a desire to move directly to building sectors of an economy that carry an image of modernization. In addition, political systems, which are typically urban based, have tended to direct resources to the urban industrial sector. To this day, the role of agriculture in economic development is hotly debated.[1]

A careful look at the economic history of many of the now developed countries suggests it is difficult to separate an agricultural revolution from an industrial revolution. A revolution in the agricultural sector will trigger increases in farm productivity, in demand for agroindustrial products, and in purchasing power of rural households. These changes expand the market for consumer goods and thus create pressure for industrialization. An industrialization program pursued without regard for agriculture, by contrast, is unlikely to succeed. Either the supply of foreign exchange or the size of the domestic market will be insufficient to sustain the program.

Analyses by the International Food Policy Research Institute have shown that most of the developing countries that grew rapidly during the 1980s experienced rapid agricultural growth in the preceding years (von Braun et al. 1993). For example, China's remarkable annual growth rate of 9.5 percent in the 1980s was stimulated by agricultural policy reform and support of the farm sector in the late 1970s and early 1980s. Indonesia's annual agricultural growth of 4.3 percent during 1965–80 facilitated annual gross domestic product (GDP) growth of 5.5 percent during 1980–90. Thailand's agricultural growth of 4.6 percent a year during 1965–80 contributed to annual GDP growth of 7.6 percent in 1980–90.

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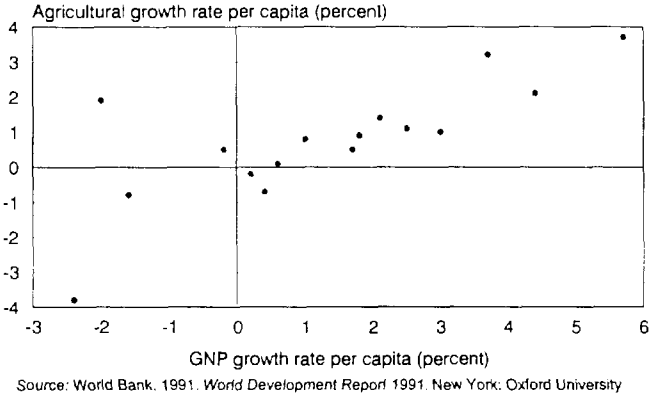
1 Many analysts have examined the role of agriculture in economic growth. See, for example, John W. Mellor, "Agriculture on the Road to Industrialization," 1986; José René C. Gayo, "Agriculture's Place in Economic Development (and the Pitfalls of a Myopic Industrialization Strategy)," 1993; and G. Edward Schuh, "Macroeconomics of World Agriculture," n.d.

There is a 75 percent correlation between agricultural growth and overall economic growth in the least developed countries, and a 21 percent correlation between these growth rates in the less developed and middle-income countries over the period 1965–89 (von Braun 1991). The high correlation in the least developed countries is not surprising, given the large share of the agriculture sector in these economies: agricultural contributes about one third of GDP in low-income countries and employs more than half the labor force. As suggested by figure A1, neglecting agriculture adversely affects the rest of the economy. In short, it is difficult, if not impossible, to stimulate sustained economic growth in the least developed countries without first moving the largest sector, agriculture.

Figure A1. Agricultural Growth and Economic Growth in 16 Low-Income Developing Countries, 1965-89



Source: World Bank. 1991. *World Development Report* 1991. New York: Oxford University Press.

Note: Countries were Bangladesh, Burundi, China, Ghana, India, Indonesia, Kenya, Malawi, Mali, Nepal, Niger, Nigeria, Pakistan, Sri Lanka, Tanzania, and Zambia.

Schuh provides a clear exposition of how investments in agriculture, especially to develop new agricultural technology, can serve as a powerful source of overall economic growth (Schuh n.d.). Introduction of new technology (the product of agricultural research) has the effect of increasing yields or reducing the cost of production (or both). Early adopters of this technology will tend to reap its initial benefits, for they will have lower costs of production while the product price is not yet affected. But as adoption of the technology spreads, the increase in supply that results tends to drive the product price down. Most benefits of the new technology are thus passed to the consumer, especially if the commodity for which the new technology is produced is one that is domestically consumed (such as rice). These benefits to the consumer can be large, and this is one of the reasons the estimated rates of return to investments in agricultural research are so high.

Moreover, since poor people tend to spend a larger share of their budget on food than do middle- and upper-income people, the poor tend to benefit in a relative sense. In addition, the decline in the price of a major consumable good (food) leads to increased personal income, which is a powerful source of additional economic growth. The effect is to increase demand for other consumer goods and services and thus stimulate employment and more general economic growth.

If the new production technology happens to be for a tradeable good (such as coffee), foreign exchange earnings will tend to increase, either because the country becomes more competitive in international markets and thus will increase its exports, or because imports of the commodity will decline and foreign exchange will be saved that way. In either case, more foreign exchange becomes available to finance a higher rate of growth in the domestic economy. In the case of tradeable goods, farmers (producers) will receive a larger share of the benefits, while in the case of nontradable goods (such as food), the benefits will be distributed more broadly in society and will favor the poor.

It is understandable, then, why investments in agricultural research designed to produce new production technologies are now widely accepted as the most efficacious means of promoting agricultural development. Of course, the success of this approach is predicated on farmers' adopting the new production technology, and this is predicated on an economic policy framework that creates an opportunity for farmers to make a profit.

Developing countries tend to discriminate against their agriculture by overvaluing their currencies (an implicit export tax and import subsidy) and by imposing domestic price controls to keep the price of food low (thereby favoring urban consumers). The result is that the domestic prices of agricultural commodities in these countries tend to be substantially below international market-clearing levels, and the incentive for farmers to adopt new technologies is weakened.

By contrast, industrial countries (the European Community, Japan, and the United States) provide high levels of protection for their agricultural sector, with domestic prices substantially above international market-clearing levels; moreover, these countries tend to dump on the international market the excess supplies that accumulate in government hands as a result of domestic commodity programs. Because of these distorted incentive structures, far too much of the world's agricultural output is produced in the high-cost industrial countries; far too little is produced in the low-cost developing countries.[2]

Therefore, to the extent a country's economic policy environment encourages adoption of new, high-productivity technology, a modern agriculture sector can emerge to support overall economic growth. A technologically oriented policy environment recognizes that

- Agriculture is the major source of exports and therefore *is the major source of foreign exchange* needed to pay for imported capital equipment and raw materials required by other sectors
- Agriculture *contributes to poverty reduction* because it leads to an increase in the supply of less expensive food as well as to an increase in demand for labor
- Agriculture *is a source of employment* for the rapidly growing rural population, and eventually it supplies labor to the industrial sector
- Agriculture *generates savings* for use by industry or by the government to invest in social overhead capital
- Agriculture *supplies raw materials* to industry and *generates demand for industrial products*.

The more efficient agriculture is, the better it can perform these functions.

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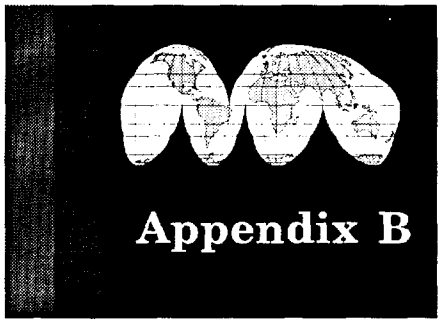
[2] The 1986 *World Development Report* provides a thorough analysis of these distortions in the agricultural sector and how they adversely affect economic development.



Evaluation Synthesis Methodology

THIS APPENDIX examines the Government Accounting Office (GAO) evaluation synthesis methodology and the extent to which it is useful in carrying out, relatively quickly, desk studies that evaluate the effectiveness of USAID development assistance programs.

What is the GAO Evaluation Synthesis Methodology?[1]

Over the past several decades the GAO has developed a series of methodological approaches for furnishing analytical information to congressional decision-makers on issues and options under legislative consideration. One of these approaches is the evaluation synthesis methodology, which has evolved as a means of providing Congress with objective evidence on the performance of nationwide federal government social service programs. The GAO describes the methodology as follows:

> The Evaluation Synthesis presents techniques by which questions about a federal program are developed collaboratively with congressional committee staff, existing studies addressing those questions are identified and collected, and the studies are assessed in terms of their quality and, relative to the strength of the evidence supporting the findings, used as a database for answering the questions. The end-product is information about the state of knowledge in relation to the particular questions at a particular point in time. (GAO 1992, 1.)

The methodology has been codified into seven steps.

1. *Specify the questions to be answered.* This is a critical step. In this study, the CDIE concept paper specified six questions of interest to the intended audience: senior USAID officials. It was anticipated that the methodology might not be totally appropriate for answering all six of these questions.

2. *Gather the universe of documentation.* Given the breadth of topics to be covered under this study, it was clearly impossible to start with the "universe of documentation." The CDIE concept paper provided a preliminary list of relevant documentation, illustrating the type of documents to be reviewed. These in-

[1] Much of the information in this section is based on GAO, *The Evaluation Synthesis*, March 1992.

cluded syntheses of evaluations of programs and projects in the five agriculture subsectors, monographs and journal articles of a more general nature, and summaries of research results. Many of these documents cited evidence (often empirical) in other documents, and these citations represented a fourth source of documentation. A computerized search of potentially relevant documents included in the USAID database constituted yet another source. The consultants, who were specialists in one or more of the five subsectors, were responsible for assembling as much relevant documentation as possible given the time and resource constraints.

3. *Develop criteria for choosing studies.* A vast literature exists within each of the five subsectors of agricultural development. This necessitated a high degree of selectivity in choosing studies to review. The synthesis by the International Food Policy Research Institute (IFPRI) on rural infrastructure (Ahmed and Donovan 1992) served as a model of the type of information to be gathered for each of the other four subsectors. Studies were to be selected and reviewed if they provided credible, reliable, accurate evidence (generally of an empirical nature) that would help answer one or more of the six questions. The expert consultants were expected to make these judgments.

4. *Organize and implement a reviewing strategy.* The IFPRI synthesis served as a model for organizing a reviewing strategy. The consultants were to work in close collaboration with each other (and with CDIE), and the work was to be done in an iterative fashion. This was facilitated by three day-long study meetings (at the beginning, middle, and end of the time allocated for the subsector studies). This provided an opportunity not only to determine the extent to which the synthesis methodology was appropriate for answering all six questions (step 5) but also to begin synthesizing the five background papers. Given the diversity of the materials reviewed and different work methods used by the consultants, review strategies varied in their detail. However, the group meetings emphasized adherence to basic principles such as "letting the literature speak for itself"; that is, limiting the extent to which the consultants injected their own opinions into the syntheses that they reviewed.

5. *Redetermine the appropriateness of the synthesis method.* Both consultants and CDIE recognized that the evaluation synthesis methodology could deliver only so much, and that it might not be possible to answer all six questions. CDIE anticipated that alternative methodologies or an alternative way of casting the questions might be needed.

6. *Implement the evaluation synthesis and check for problems.* As suggested above, the consultants and CDIE met at predetermined intervals to identify problems and make appropriate adjustments in the method.

7. *Present findings.* The IFPRI synthesis on rural infrastructure also served as the model for presenting information on the other four subsectors. The main idea in the GAO method is to present findings in the simplest way possible consistent with accurate transmission of the main points and complexity of the subject matter. This can involve the use of strict page limits and graphical means of presentation.

Using the GAO Evaluation Synthesis Methodology for this Desk Study

This desk study illustrates some of the difficulties one can encounter when using the GAO evaluation synthesis methodology. These can best be illustrated by discussing each of the seven steps of the method.

1. *Specify the questions to be answered.* First, some of the questions—as posed—were not amenable to being answered using information generally available in most of the evaluations. ("The literature reviewed does not cover this topic" was a frequently cited comment in the individual background pa-

pers.) Therefore, for some of the six questions, the consultants had to rely exclusively on their own experience. Second, the consultants had no input into the specification of the questions to be answered and no interaction with the intended audience (USAID senior decision-makers). Third, although the six questions are relevant and important, some of them could perhaps be more easily and meaningfully answered by a relatively large panel of experts (representing countries at different stages of agricultural growth) and by panels of subsector experts.

2. *Gather the universe of documentation.* Given the subject matter and time frame, gathering relevant documentation (even for experienced consultants who are experts in their fields) was a major task. In fact, the literature-review stage was so time consuming that it may have excessively reduced the time available to synthesize and analyze findings and draw conclusions.

3. *Develop criteria for choosing studies,* and

4. *Organize and implement a reviewing strategy.* Given the breadth of the subject matter covered and the large variations in the nature and availability of evaluation material to review and synthesize, the criteria for choosing studies varied among the subsectors. For example, more literature was available, and more of it had been systematically "digested," for some subsectors than for others. Thus, some consultants had to rely more on individual case studies and less on well-done syntheses of evaluations.

5. *Redetermine the appropriateness of the synthesis method.* For all intents and purposes, this step was overlooked, and the synthesis method was judged, implicitly, to be appropriate. For example, even though some of the consultants had problems addressing some of the questions as originally stated, none of the questions was dropped or significantly modified at this stage. Of course, learning that the evaluation literature was not helpful in answering certain questions was itself an important finding.

6. *Implement evaluation synthesis and check for problems,* and

7. *Present findings.* Despite the limitations noted above, the consultants encountered no problems in these last two steps. The general quality of the background papers was high. However, some of the consultants required more time to revise and edit their papers than had been budgeted.

Using the GAO Evaluation Synthesis Methodology for USAID Assessments

The GAO has used the methodology to evaluate social service programs such as the CETA job training centers; the WIC food programs for women, infants, and children; the OEO block grants; and special education programs for handicapped children. Much of the methodological discussion in the GAO manual concerns large numbers of "replications" and "treatment groups." In short, the GAO methodology seems to have been used to evaluate programs that are quite different in scope, homogeneity, number of replications, and other key features from the types of activities that characterize USAID's socioeconomic development work. Therefore, it may not work as well for agricultural development programs implemented overseas as it does for federal social-service programs implemented in the United States.

In particular, the types of programs evaluated by GAO tend to have 1) many (often hundreds of) replications of the same narrowly focused program activity, 2) replications that occur during the same time period (e.g., FYs 1986–89), and 3) a standardized evaluation format (often with evaluation reports already collected in a departmental file cabinet in Washington waiting to be synthesized).

The thrust of the GAO methodology concerns the relationship between perceived program success and *how* programs were implemented. For example, the GAO manual discusses the use of different "treatments" in the manner commonly used by experimental psychologists and sociologists. Although the desk study sought to identify conditions under which activities in the five agriculture subsectors were more likely to succeed, it did not dwell as much on implementation issues.

Conclusions and Recommendations

Because the GAO methodology relies exclusively on synthesis of existing materials, it does not require costly collection of additional evaluation material. Cost is always an important consideration, but especially so during a period of severe budgetary constraints. Use of the GAO evaluation synthesis methodology for a very broadly defined topic, such as investments in agriculture, is probably not appropriate. But, the general principles that underlie the methodology make sense, and its use may be appropriate for evaluating other USAID programs.

1. At the most general level, the following principles underlying the methodology should be applied to all USAID evaluation studies and perhaps incorporated into a CDIE "evaluation manual."

a. At the outset there should be a clear definition of the questions to be answered and the scope of written sources to be used. When possible, the evaluation team should develop the key issues to be addressed in collaboration with members of the target audience or client group.

b. The most important principle in producing a synthesis of evaluation results is to let the evaluations speak for themselves and to be rigorous in filtering out the author's personal views unless they correspond with stated findings or conclusions in the evaluations. Specific techniques should be used to reduce evaluator bias and to let the sources speak for themselves.

c. The initial set of questions, the sources of evaluation information, and the evaluation synthesis procedures should be reviewed and modified as needed. A clear and coherent list of the projects to be evaluated and the evaluation reports to be consulted should be specified. If new ideas are found during the first round of the synthesis process, the evaluation team should meet again with representatives of the target audience to review the initial questions and modify or replace them if necessary. It may be useful to review each of the seven basic steps of the methodology several times, because it is not always clear at the outset what the relevant literature is that should be synthesized.

2. The GAO methodology can be used most successfully with USAID programs that have the following characteristics:

a. The programs are in the area of services, such as population, housing, education, disaster relief, and health and nutrition. Even in agricultural development, the GAO methodology might be appropriate for evaluating, for example, a specific type of agricultural credit project (e.g., loans to national agricultural credit banks to be on-lent to farmers), assuming enough of these projects had been implemented and evaluated to permit a representative synthesis. Even then, however, there may be considerable variance in measuring dependent variables (such as repayment rates) because the projects were implemented in many national environments (a problem that is minimized in evaluating federal social services programs implemented only within the United States).

b. There have been sufficient replications of a particular project type, implemented over a specific, limited time frame (5 to 10 years), to permit a comparative evaluation.

c. A reasonably standardized methodology was already used to evaluate the projects, so that it is clear at the outset what documents

should be synthesized. This would not, however, preclude the use of illustrative case studies and academic literature to complement the core documentation.

3. As part of the proposed CDIE evaluation manual, there should be an elaboration of the evaluation synthesis methodology that recognizes the need to

a. Specify appropriate economic (and sociological) performance criteria; the latter dominate the GAO methodology.

b. Combine in the evaluation synthesis i) qualitative as well as quantitative information, ii) case studies and more systematic evaluations, iii) rates of return and other measures of success, and iv) political and socioeconomic variables.[2]

c. Make modifications to accommodate the realities of socioeconomic development; for example, long time periods, small sample sizes, and the difficulty of comparison across countries with widely divergent social, cultural, and religious values.

4. Objective project evaluations in the field should be consistently undertaken. This will facilitate programmatic syntheses done later in the home office, which makes sense from both a financial and management point of view.

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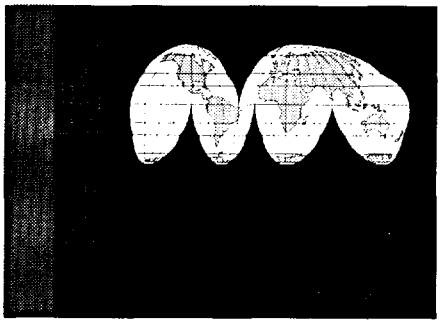
[2] The second half of the GAO manual is largely devoted to these methodological issues, but primarily from the point of view of sociology, experimental psychology, or the even murkier "evaluation science."



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